34th YEAR OF PUBLICATION

Chemical Weekly

VOL. XXXIV AUGUST 15, 1989 NO. 49

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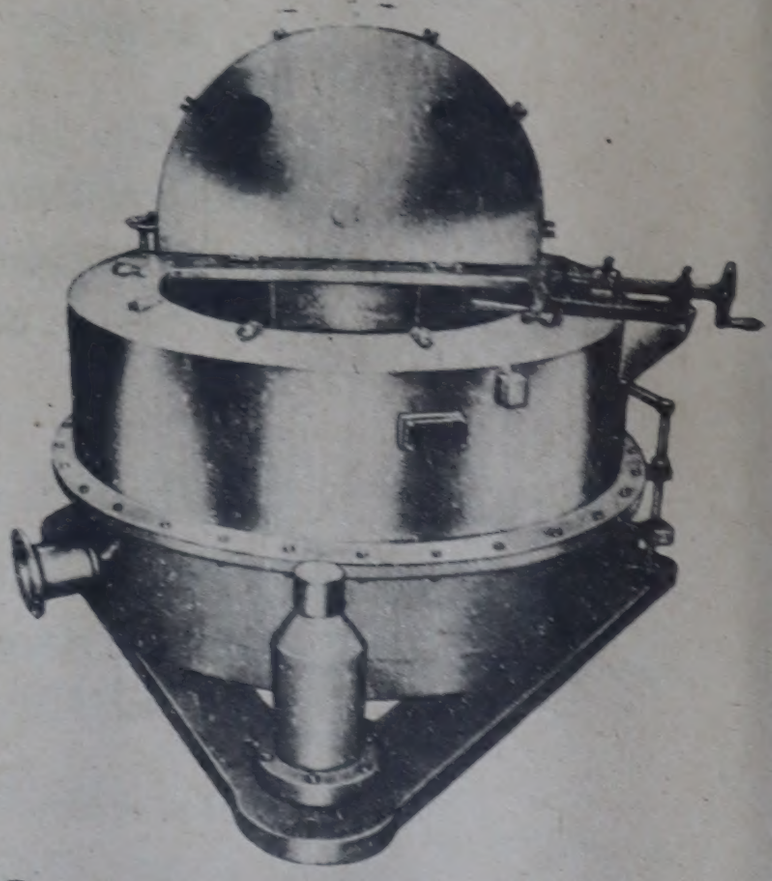

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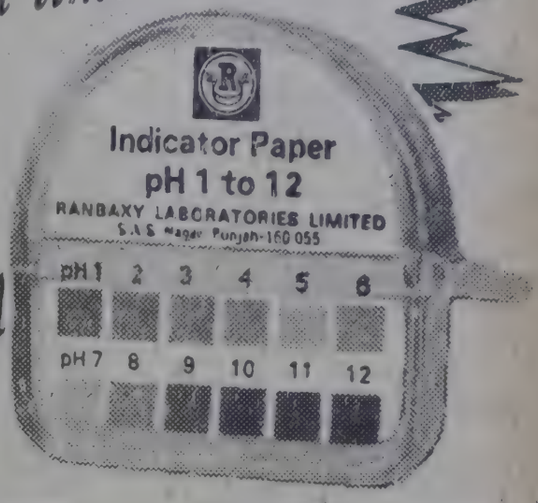

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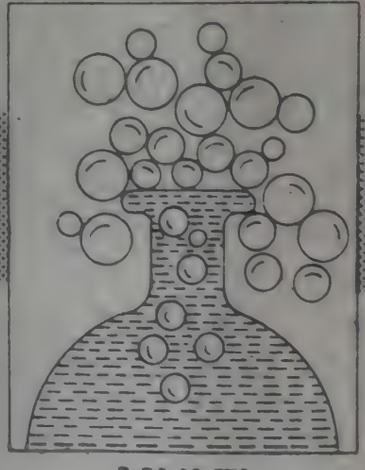

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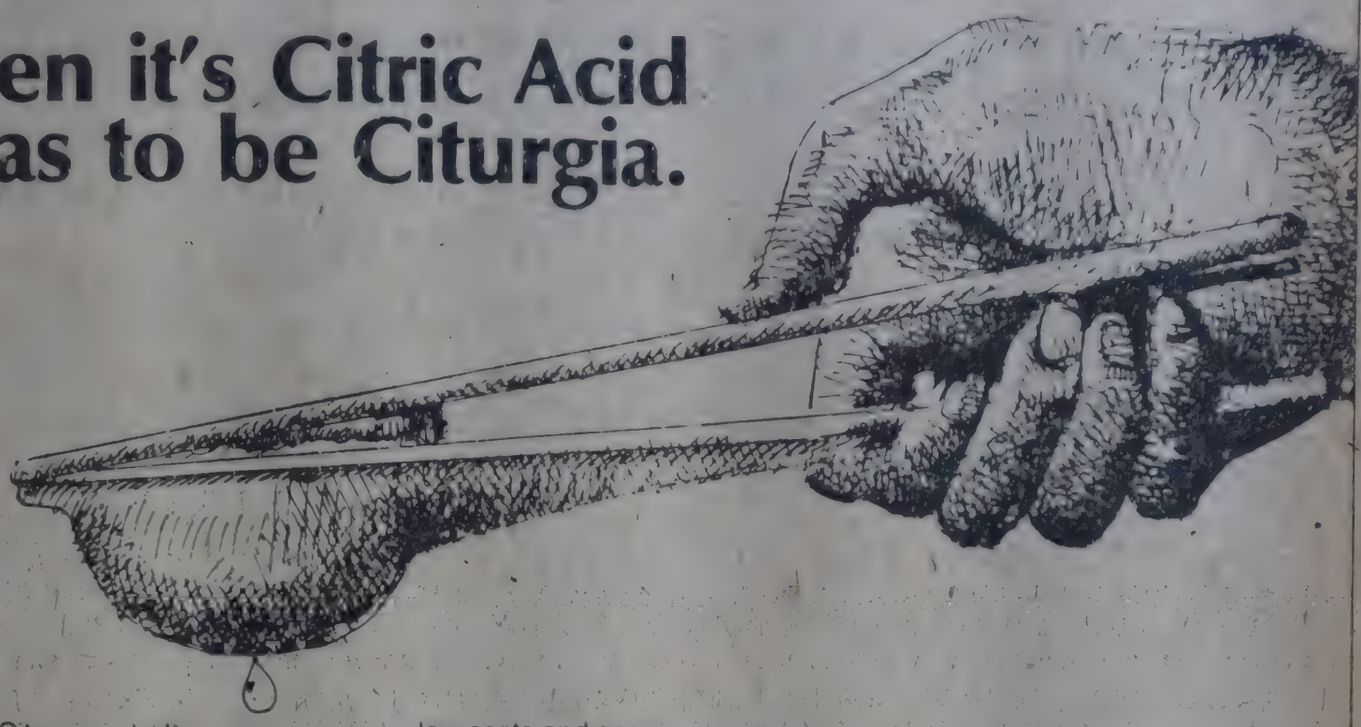

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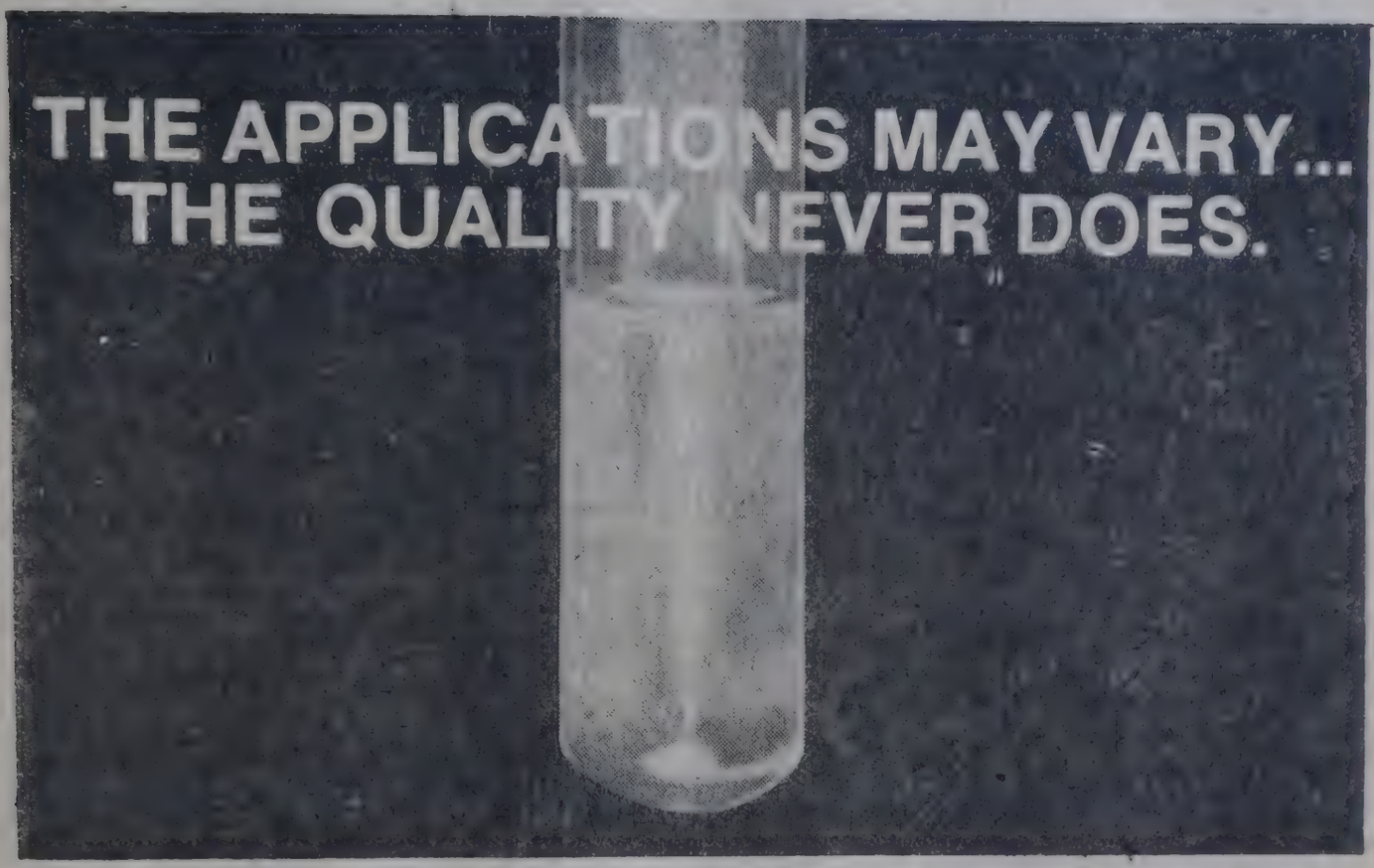

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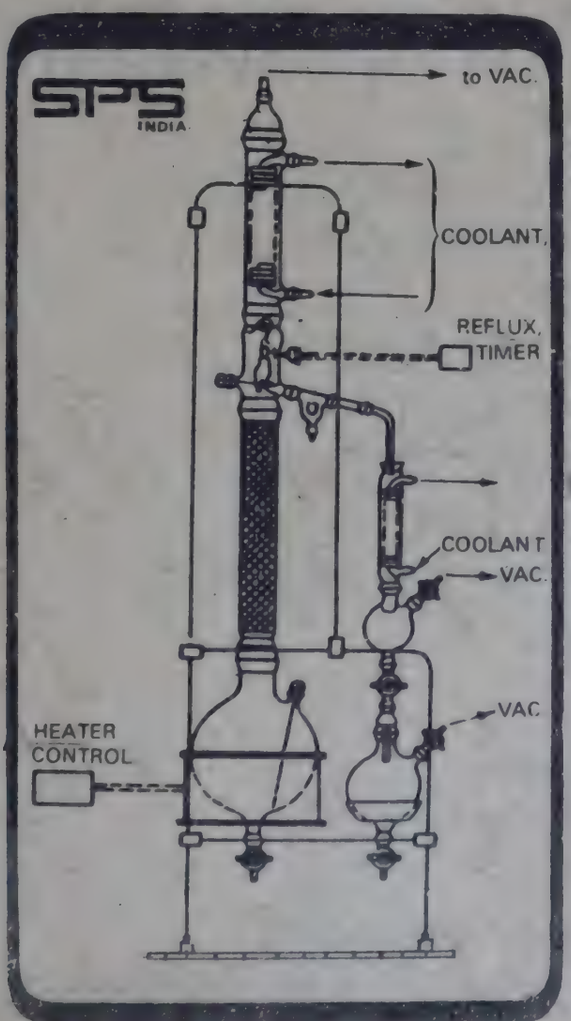

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CHEMICAL WEEKLY

VOL. XXXIV AUGUST 15, 1989 NO. 49

HERALDING THE 21st CENTURY - 25 (e)

The Environmental Challenge: Will there be water fit to drink?

Of the Earth's total supply of water, only about three per cent is fresh, and the bulk of that is locked up in polar ice caps or as groundwater so deep that it is inaccessible. Even so, there are something like 4,300,000 cubic kilometers (a million cubic miles) of usable fresh water, and none of it is ever lost; there is exactly the same amount of water on Earth today as there was when it was born.

The drinking water problems of the industrial nations and developing countries are quite different. In industrialised countries the threat to the quality of water is of prime importance; in the Third World it is scarcity that is the key. In 1975 the World Health Organization estimated that some 60% of the people in developing countries did not have enough water. Between nine and 22 million children less than five years old die each year because of lack of water, inadequate sanitary facilities, and waterborne disease.

The authors of the American report on the environment, Global 2000, expect annual increase of four to five per cent by the end of this century. Water consumption in urban households will quadruple between 1967 and 2000; demands made by industry and mining will increase fivefold. An example of just how much water can be used by industry is given by the Federal Republic of Germany. There, electricity production and mining account together for up to 80 per cent of the water requirement. Seventy percent of it, in turn, is needed to cool down heat-generating stations. The chemical, food, paper, pulp and metal-working industries account for upto two-thirds of the remaining 30 per cent.

Though fulfilling demand is not difficult, keeping water pure is. The waste water re-directed into the rivers contains pollutants. Those generated by the paper industry (non-degradable organic and chlorine-based substances), the metal-working industry (heavy metals such as chromium, nickel, zinc, cadmium, lead) and the petrochemical industry (minerals oils, phenols) are particularly damaging to rivers, lakes and canals).

In spite of stricter laws and the expenditure of more money, water reserves are still considerably at risk from pollutants. Non-degradable industrial chemicals such as organohalogen compounds (e.g. chloroform, trichloroethylene and tetrachloroethylene); polycyclic aromatic hydrocarbons and pesticides (e.g. DDT and HCH); and polychlorinated biphenyls (PCBs) have not only been detected in sewage but also in surface water, seawater and rainwater, and even in filtrates at the water's edge and in ground and drinking water.

The dirtiest river in Europe.

About one-fifth of the world's chemical production takes place on the banks of the Rhine. Nonetheless, 20 million Europeans still obtain their drinking water supplies from the river. There is practically no difference between the conflict facing the West German authorities over the use of the Rhine as a sewer on the one hand and as a drinking water reservoir on the other, and the current situation in many developing countries. In the latter the inadequate separation of drinking water and waste water has led to considerable hygiene problems. Without intensive purification of the Rhine's effluent, the river could degenerate into little more than a sewer and drinking water could be recovered only at considerable risk.

In spite of various anti-pollution measures adopted by industry, vast amounts of chemicals are still being dumped into wells and water-ways from which drinking water is derived. Already about ten per cent of drinking water in West Germany is contaminated with nitrate fertiliser exceeding the permitted limit of 50 milligrams/litre.

Pesticides also penetrate deep into ground water -- the worst culprit being atrazine. This herbicide, principaly used in maize production, has been detected in various groundwater samples in the West German states of Baden-Wuerttemberg, Bavaria, Hessen, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate and Schleswig-

Holstein. The highest concentration found in ground water was 2.5 microgrammes per litre. However, atrazine is only the tip of the iceberg. Up until now 38 different pesticides have been detected in groundwater, drinking water or filtrates at the water's edge including aldrin, an established carcinogen, and the fungicide hexachlorobenzene (HCB). In 1987, 8.62 milligrams of the nematicide 1,3 dichloropropene were detected per litre of ground water in Schleswig-Holstein. As early as 1982 one milligramme of the herbicide mecoprop was discovered in a spring in Baden-Wuerttenberg. Similarly in 1987, 17 microgrammes (0.017 milligrams) of the notorious chemical 2,4,5-T known as "Agent Orange", were found. The water works in question were not forced to close down because West Germany's legislation on pesticide limits (i.e. 0.1 microgrammes per litre for single substances and 0.5 microgrames per litre for the total amount of pesticide) did not come into force for almost two years, at the beginning of November 1983.

The U.S. Scene

At the turn of the century about 200,000 million litres (52,800 million US gallons) of water were consumed daily in the USA. This had increased to 1,911,000 million litres (504,800 US gallons) at the end of the 1970s. Individual consumption rose from 45 to 764 litres (12 to 202 US gallons) per day. Without strict economy measures, every American citizen will consume more than 1,000 litres (264 US gallons) of water per day by the year 2000. Many cities such as New York or Denver have never even heard of water meters --everyone is allowed to use as much water as he or she wants.

In many places in the USA groundwater is already contaminated. In 1982, poisonous industrial chemicals were detected in the groundwater of 35 states. The most common contaminants were found to be the solvent trichloroethylene (TCE) and the pesticide dibromochloropropane (DBCP). Wells in 25 states had to be closed due to serious contamination.

Till now, more than 700 chemicals have been detected in US drinking water, 129 of which are considered to be particularly dangerous by the United States Environmental Protection Agency (EPA). Nonetheless, drinking water is regularly tested for only 14 of these contaminants. Another EPA study conducted in 1983 showed that in 52 out of 186 towns and municipalities with more than 10,000 inhabitants, traces of toxic chemicals were detected in the drinking water. One of the reasons for this is that supplies are often from sources near former industrial sites, or sites where hazardous wastes have been dumped. This problem first came to light with the Love Canal scandal.

Great Lakes -- problems with pollution

It is not just America's groundwater reserves that are being poisoned, but also its surface waters. The Great Lakes, for instance, covering an area of 242,000 square kilometers (9,340 square miles), form the largest fresh water reservoir in the world. That ecological system, however, has been irreversibly degraded by human settlements, the introduction of modern agriculture and industrialization -- all on a massive scale. Forty million people live in the area adjoining the Great Lakes, 80 per cent of them in large conurbations.

Emergency situation in Holland

The Netherlands is among the countries of Europe with the lowest reserves of fresh water and is therefore experiencing great difficulties in making sufficient drinking water available. Good quality drinking water is rare and is obtained chiefly from the dunes in the Gooi region (a sandy area to the east of Amsterdam), in Veluwe (in the province of Gelderland) and from the quaternary and tertiary sandy deposits in the east and south of the country. Up until 1955, both the Hague and Amsterdam extracted groundwater from a lentil-shaped fresh water deposit which was floating on the underlying salty ground-water. However, since the rate of extraction was far in excess of recharge, those cities were forced to switch to alternative sources from 1955, that is, from the Rhine and the Maas. Both these rivers are, to a considerable extent, polluted with all sorts of synthetic organic industrial chemicals. It is not only the routine releases (which are only permitted in certain areas) all along the Rhine in Switzerland, France and Germany that are responsible for this, but also large-scale releases caused by the inevitable accidents that occur frequently.

The problems of pollution of drinking water sources has reached a stage which cannot be solved by the available technology. It is unlikely that water purification techniques will enable us to derive from highly contaminated sources on a sufficient scale, and at an economic price, the pure drinking water that we require. Nor one can conceive of any technological means of overcoming the water shortages that are likely to occur as a result of the destruction of the world's tropical rainforests. It follows that wherever possible drinking water supplies should be derived from clean and unpolluted water. This means that rigorous conservation measures are necessary to protect both our ground water reserves and our surface waters. In particular, it means that agricultural and industrial chemicals must not be allowed to enter our water supplies. To achieve this, considerable changes are required in the operation of our industrial system. Dangerous chemicals must be used only in closed circuit systems so that they cannot enter into contact with the biosphere. The production and use of persistent chemicals that cannot be used in this way should be prohibited and modern intensive agriculture, depending as it does on nitrates, phosphates and synthetic organic pesticides whose use must inevitably contaminate groundwater reserves and surface waters, must be phased out.

Our water reserves, even where they are abundant, must be used with the utmost respect. If they are not, the availability of clean and unpolluted water in the next decades will decrease, with the most serious consequences for our health and the health of living things in general.

-- T.P.S. RAJAN

(Source: ***Water fit to drink?*** The South Report, ARMIN Maywald, Babara Zeschmar- Lahl and Uwe-Lahl).

CHEMARENA

S.L. VENKITESWARAN

Polypropylene Process

Polypropylene process has undergone major changes over the years through far more highly active catalysts and process innovations with elimination of the solvents used earlier and of the need to remove residual metals. The reaction phase has also changed from the earlier liquids to the modern vapour phase reactors. Comonomers add to the variety of products, grades and properties.

The original producers -- Montedison and Hercules -- have joined up into a joint organisation of name Himont which is not only the biggest producer in the world but also the biggest process licensor. Improvements have been many until it has resulted in the latest "Spheripol" technology and only recently has the option of Union Carbide's Unipol process emerged. An analysis of the licencees for the alternative processes in terms of tonnage is reproduced alongside:

	Total capacity by 1992	Licencees (in mil. tonnes)	Number
Spheripol	4.265	2.15	23
Unipol	2.11	2.11	19
Novolen	1.7	0.81	8
Others	5.9	--	--

Many parties have changed over from the old slurry process but still half of 1988 capacity is the old one. India's plant is shifting in a year or two. The spheripol process is used by the licensor for his own plants to the extent of 50% while Unipol capacity is all with licensees. The Himont Spheripol process is of two phase with an initial liquid pool reactor and then a small gas phase one to make the copolymer and this is claimed to be more flexible and less costly. The real battle is for the new capacity to the extent of 3 million tonnes by 1992 -- to 14 million tonnes.

PVC in Europe

In line with the recent trends in petrochemicals, PVC has also recorded good growth rates in West Europe -- as much as 6% a year since 1984. Production of 3.7 mill tonnes in 1985 has risen to 5.2 million tonnes last year. The growth of PVC is about 1.5% over the growth of gross nationai product and a slow-down is now beginning. Although production and demand are growing the capacity utilisation has been low. The need for restructuring the capacity and production units with elimination of less economic operations made two major PVC producers of W. Europe -- ICI and Enichem --to join hands and start organising EVC -- European Vinyls Corporation in 1986 on a 50:50 basis. The company has been cleared by the authorities from monopoly angle because the combined production is only 20% of West European total.

EVC has done well in 1988 even before any restructuring of production with sales of $1.28 billion (22% up) and gross profits of $235 million. EVC is going into downstream products as well -- PVC fabrication, compounding and in vinyl chloride process licensing. The actual ownership of the PVC/VCM plants of the two partners is in the process of transfer to EVC. The combined capacity is about 1.6 million tonnes of PVC and 1.3 million tonnes of VCM. Capacity reorganisation and debottlenecking of some units is being organised so that the bane of petrochemical plants -- over capacity -- does not return.

Environmental constraints and suspicion of PVC products are problems which need tackling and a combined organisation of all European PVC producers in a European Council of Vinyl Manufacturers has been formed. Individual companies of Europe have their predilections and problems and these should not come in the way of the industry when EEC becomes a single zone in 1992.

Arco Chemical forges ahead

One of the outstanding successes in technology in recent years is the propylene oxidation to the oxide through peroxides which end up as even more valuable coproducts --styrene and tertiary butanol. This Halcon technology is exclusively exploited by Arco Chemicals in which Atlantic Richfield has 83% holding. Arco Chemical is reported to have achieved sales of $2.7 billion in 1988 and profits of $494 million. It is the first in profits to sales ratio in chemicals in USA at 18.3%. Arco has nearly half in overseas production and sales. They have only three products -- propylene

oxide, styrene and TBA and growth in sales have averaged 12% a year since 1984. They are the world's largest producer of propylene oxide and expanding with more units every year through wholly owned or joint venture subsidiaries. Half a million tonnes more of propylene oxide capacity are in the pipeline including a 100,000 tonnes plant in South Korea.

Having reached the top in propylene oxide through its unique technology which is not licensed to third parties the firm has shifted to downstream derivatives. Propylene glycol is being promoted as coolant for autos and planes rivalling the ethylene glycol market. Arco has also gone into th MTBE business using its tertiary butyl alcohol co-produc Another unique process now developed is for butane diol fro propylene oxide.

India has not been able to attract Arco due to uncertain ties which dog our petrochemical programmes and we ca think of only outdated chlorhydrin process for our propylen oxide requirements in two small plants at the same locatio sharing the limited quantity of refinery propylene. No wonde South Korea and Taiwan are more attractive for firms lik Arco or ICI (for PTA).

India's Natural Rubber

India is one of the tropical countries blessed with good potential for natural rubber production but our progress has been rather slow. With the large majority of rubber producers being small with less than five acres each and very little effort to extend rubber plantation to areas other than the traditional parts of Kerala the rise in production has been far too low and always below our needs. Rubber trees take several years before the latex can be tapped and hence replacement of old trees by new high-yielding varieties is beset with the problem of survival of the small planters during the initial years. Large plantations can afford to take up replantation of parts of their holdings but even so require some compensation for replanting. The Government has evolved and implemented a policy of promoting replantation through such a scheme of compensation and this is the main instrument of our growth in natural rubber production to 2.75 lakh tonnes in 1988-89 with relatively low rise in acreage under rubber.

But consumption has been rising at higher rates to reach 3.94 lakh tonnes in 1988-89 and an expected 5.72 lakh tonnes in 1994-95. The deficit is met by the production of synthetic rubber and imports to fill the gap. There is an impression that as the world-wide pattern of synthetic to natural rubber consumption is 2 to 1 there is extra merit in going for synthetic rubber production so that the ratio in India could be raised to 1:4 or higher. This is rather misleading for there is no technical reason why natural rubber's share should not be high and perhaps the special area of usage requiring synthetics is only 10 to 15% of the total. The position in advanced countries need not be the guide for our planning as these countries do not produce natural rubber and hence limit the use of natural rubber to lowest possible levels and substitute it with synthetics as much as possible. The Planters Association of South India have projected a ratio of 75 to 25 of natural to synthetics which may be too timid and inspired by the rubber consuming industry which is often troubled by the wide swings in the price of natural rubber in India. Even on this basis of 75:25, the requirement of natural rubber in Ind is 4.29 lakh tonnes and the targets of growth likely to lea a deficit of 29,000 tonnes in 1994-95. There is a shortf even in relation to our needs assessed on a conservative ba for natural rubber and no attempt to promote aggressiv higher levels of consumption of natural rubber than 7 which is technically feasible. It is not that we are blessed w petrochemical feedstocks for producing synthetic rubber ot than perhaps for styrene of SBR. There is relative short of butanes and the emphasis on ethane-crackers for ethyl produces no recoverable quantity of butadiene unlike in na tha cracking. Today only NOCIL and IPCL crackers p vide butadiene and even the ethyl alcohol-based produc in UP has been suspended and plans are for large imp of butadiene in the coming years and transporting it all way to Bareilly in UP -- with imports being exempted f the customs levies. This is a tragic end to one of the n programmes for alcohol-based chemicals that was con plated in the Nagaraj Committee Report and implem in the early Sixties.

In this context there is a need for much more activi the production of natural rubber with aims towards some beyond self sufficiency in terms of a 75:25 share of the demand. The systematic replanting operations need higher incentives than what was envisaged earlier. Th a wide gap between our average yield per tree or ac what Malaysia or even Sri Lanka gets. There is need potential new areas for rubber plantation promoted wi quate subsidies -- more so for small growers. After al is a cess on rubber to generate funds and provide the tives. There are methods available for increasing late and reducing cost of collection. Malaysian Rubber Re Laboratories have developed epoxidised grades of rubber with improved properties. It is time to think i of a massive effort to raise natural rubber output an away from synthetics to the extent that it has to de imported feedstocks.

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Modi's caprolactum project cleared

The Government has cleared the Rs. 650-crore Modi caprolactum-cum-fertiliser project. A letter of intent for the project has already been obtained by the K.N. Modi group. The project, to be set up in the joint sector with the Orissa Government, will have an initial investment of about Rs. 400 crores. Subsequently investments worth Rs. 250-350 crores will be made depending on the expansion costs.

The total installed capacity of the project will be one lakh tonnes of caprolactum and four lakh tonnes of fertiliser (ammonium sulphate). In the first phase, the project will have a capacity of 55,000-60,000 tonnes of caprolactum and four times the amount of fertiliser.

Technology for the project will in all probability be obtained from UBE Industries of Japan. A team from the Japanese company will be coming shortly to finalise the contract.

If the contract materialises, work on the project will start by this year-end. The new project will come up in Rourkela. The name of the new company has tentatively been decided as "Modi Epilon". The project will have a debt-equity ratio of 1:3. However, the financing pattern of the project is yet to be decided. The state financing agency will have a major equity participation in the project.

The K.N. Modi group is also approaching the Washington-based International Finance Corporation (IFC) as well as the Asian Development Bank (ADB) for assistance and equity participation. Negotiations are also on with Steel Authority of India Ltd. for equity participation in the new project.

With the coming up of the new project the demand for caprolactum is expected to be largely met from domestic sources. At present there is a substantial shortfall in the production of caprolactum in the country.

Caprolactum is a basic raw material for the manufacture of nylon 6. At present there are only two units in the country manufacturing 50,000 tonnes of caprolactum each. These are Gujarat State Fertiliser Corporation (GSFC) and FACT. The Vice-Chairman-cum-Managing Director, Modi Enterprises, Mr. Y.K. Modi, said this would be one of the largest joint sector projects in the country and definitely the largest in Orissa.

Meanwhile, the profits of the K.N. Modi group had gone up by two-and-a-half times since the division in January last compared to the same period during 1988, Mr. Modi said. Besides its present activities, the group would henceforth give maximum thrust to the chemicals field, according to Mr. Modi.

DMT, PTA: PRODUCERS TOLD TO CUT PRICES

The Department of Chemicals and Petrochemicals has asked the manufacturers of dimethyl terephthalate (DMT) to reduce its price to Rs. 29,000 per tonne with immediate effect from the prevailing price of about Rs. 32,000-33,000.

Similarly, the manufacturer of purified terephthalic acid (PTA) has also been asked to reduce its price correspondingly in keeping with the fall in DMT prices, according to official sources. At present the price of PTA is pegged about 15 per cent higher than that of DMT.

DMT and PTA are the two petrochemical intermediates that are used by the polyester staple fibre (PSF) industry as raw material for the manufacture of polyester filament yarn (PFY) and partially oriented yarn (POY).

The Department has sought a reduction in DMT and PTA prices following a sharp fall in the prices of paraxylene, the raw material, in the international market. While Reliance Industries Ltd. (RIL) is presently the lone manufacturer of PTA, DMT is being produced by the State-owned Indian Petrochemicals Corporation Ltd. (IPCL), Bongaigaon Refineries and Bombay Dyeing.

According to sources, IPCL was the first to inform the Department of having already, reduced its prices of DMT to the desired level. Bongaigaon on the other hand, was in the process of doing so. Reliance and Bombay Dyeing, the two private sector manufacturers, have also been told to abide by the directive.

At present IPCL and Bongaigaon are selling DMT to the PSF industry at Rs. 32,000 per tonne whereas the Bombay Dyeing product is priced at Rs. 33,000. Thus the proposed reduction as a percentage of the prevailing prices will be higher in the case of Bombay Dyeing. Meanwhile, the Department has convened a meeting with the polyester yarn manufacturers to ask them for a corresponding reduction in PSF and PFY prices.

HERDILLIA CHEMICALS

Herdillia Chemicals has placed orders for imported items and for long delivery indigenous equipment for the magnetic iron oxide project at Lote Parshuram. Civil construction has commenced and the plant is expected to be commissioned by mid-1990. The polybutenes project is being implemented through Herdillia Polymers, a joint sector company with Maharashtra Petrochemicals Corportion with a capacity of 5,000 tonnes per annum.

The company has made similar progress in the ethylene propylene rubber project with a capacity of 10,000 tonnes per annum, which is being implemented through Herdillia Unimers. The technology packages for these projects are being finalised shortly and necessary finances have been arranged through financial institutions.

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Technological Frontiers And Foreign Relations

This title (Ed.: A.G. Keatley for National Academy of Sciences, National Academy of Engineering and Council on Foreign Relations, Asian Books, New Delhi, India Edition 1987) evolved from papers by contributing members of the three sponsoring organisations for a symposium on the subject. Over a period of two years, the authors discussed the subject among themselves and also with several individuals with diverse backgrounds. The technological forecasts were prepared and reviewed, thereafter papers discussing their impacts on foreign policy were drafted, discussed and finally edited for the present book. Allen E. Puckett, Chief Executive Officer and Chairman of the Hughes Aircraft, who acted as chairman for the symposium, has the unique distinction of being a member of all the three sponsoring organisations. The book is very timely, since the interplay of science, technology and foreign relations is very topical in line with Winston Churchill's prophecy, 'The empires of the future are the empires of the mind'. Authors seek to answer:

Will genetic engineering help poor nations feed themselves?

Will recent and current materials and biotechnology research find commercial applications in the next 5-10 years?

What do these advances mean for the international community?

How can science and technology be used to serve mankind? etc.

After a brief introduction, there are ten chapters by authors specialists in their fields dealing with: 12 Foreign dimensions of National Technological Policy; 22 Telecommunications; 46 Computer Sector Profile; 79 Aerospace; 110 Materials Sector Profile; 165 Energy Sector; 191 Biotechnology: Status, forecast and issues; 227 Future International Relations; 266 Impact of U.S. Technological advances and foreign policies on developing countries; and 285 Technology and East West Relations. In most of the fields covered by the book namely aeronautics, biotechnology, computers, energy, materials an telecommunications, broad technological trends rather tha radical new developments will affect foreign relations ove the next two decades. The projections in these fields, a presented here, can best be appreciated by understanding th nature of the 'innovative process'. Instead of looking at spe cific products, one needs to examine the continuous proces to produce and use scientific knowledge and technologic expertise in a highly integrated system covering educatio research and development, manufacture, marketing and final distribution. On the national front, a variety of instrumen to support innovation are used, and in the international aren there can be conflicting interests and barriers to penetratio The initial R & D costs are enormous and these can only b recouped from a wide international market. With few barrie to penetration, the U.S. offers a ready and large market f other nations. The Japanese market is also significant, b it is largely protected against foreign technology and produc

Developing countries have emerged as an important mark sector and this is well catered by a variety of governme actions including technical assistance, political support a trade deals. The technology policy of a country are det mined by both foreign as also domestic parties. With lar scale development in many countries, the importance of U in the East-West trade has been declining in recent years. T East-West tensions over technology transfer policies are bei aggravated by the emerging trend in 'technological prot tionism' in the U.S. Hopefully, with the warnings raised the present study, we can avoid the threatened 'intellect isolationism' which could strain East-West relations a affect the free and open flow of technology and ideas — the detriment of every one.

On the whole, here is an interesting study on a vital somewhat neglected area.

Dr. Kharbanda, a Fellow of the Institution of Chemical Engineers, is a visiting professor and an author or repute. His latest title: CAPITAL COST ESTIMATING FOR THE PROCESS INDUSTRIES with E.A. Stallworthy (Butterworth end-1988).

Curbs on giant chem units mooted

The Environment Minister, Mr. Ramrao Adik, said that the State Government would take up the issue of prohibiting multinational companies from continuing chemical processing, which are banned in Western countries, with the Union Government.

Giving a detailed reply to a two-hour debate on the adoption of rules and regulations of the Central legislation on environment protection, Mr. Adik said in the Assembly that the issue was serious and called for immediate attention.

Mr. Ram Naik, BJP, had drawn the attention of the State Government on the issue alleging that many banned proceses were being operated by multinational companies in the State. Mr. Adik said that the Government had identified industrial units on the basis of the Garg Committee report on hazardous industrial units which would be encouraged to shift their operations outside the city.

Replying to a point raised by Mrs. Parvati Parihar, Congress, no new industrial unit would be allowed without prior permission from the Pollution Control Board. Accepting the criticism against the Board that it was not properly staffed and lacked adequate resources to book culprits who ignored anti-pollution measures Mr. Adik said the State Government would take steps to strengthen the organisation.

Mr. Datta Patil, PWP member from the pollution-hit Raigad district, referred to the Pollution Control Board's poor performance in prosecuting companies responsible for pollution. The Government ought to give the Board technically qualified staff, he added.

He said as a member of the legislature committee, he had visited the Sangli Cooperative Sugar Factory and found that it was causing serious pollution. The foul smell from the effluents made life miserable for hutment dwellers staying nearby the factory.

Mr. Patil contrasted the clean water in rivers in the Soviet Union and Germany (he did not mention whether West or East Germany) with the pollution of our rivers on which the villagers depended for their drinking water.

Mr. Sharad Khatoo (Kamagar Aghadi) said some factories in Bombay found the pollution a good excuse to shift to other areas without providing compensation for affected workers. He said the government failed to take action against Reliance or NOCIL causing pollution in Raigad district.

GIIC TO LAUNCH VENTURE CAPITAL FINANCE SCHEME

Gujarat Industrial Investment Corporation Limited (GIIC) has proposed to launch the venture capital finance scheme. Mr. S.K. Shelat, Managing Director, GIIC, explained that GIIC will be supported in this new venture by organisations like the World Bank and IDBI. Other foreign companies engaged in venture capital finance abroad and Commonwealth Development Corporation are also expected to participate.

Mr. Shelat was addressing a workshop attended by representatives of leading industries as well as scientists from reputed scientific research institutions.

He explained that the idea behind the scheme was mainly to support innovative and high risk ventures based on new technologies and new product lines or for non-conventional products like development of computer software.

Mr. Shelat made it clear that GIIC's role in financing venture projects will not be limited to that of a mere financier. The Corporation will take active interest in the working of the company and provide management support if and when needed.

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SPCL unit to go on stream

Sumitra Pharmaceuticals and Chemicals Ltd. (SPCL) for manufacture of bulk drugs ibuprofen and mebendazole will go on stream by the year-end, according to Mr. Ramesh Jain, Managing Director.

SPCL, he said, was among the first few companies in the country to have adopted the 'swing plant' concept that enables the unit to increase the capacity of ibuprofen from 300 tonnes per annum to 400 tonnes by utilising the capacity of 50 tonnes per annum for mebendazole and vice versa. The company had a licence to manufacture 2,000 tonnes of ibuprofen and 500 tonnes of mebendazole per annum.

Mr. Jain said ibuprofen was a unique three-in-one drug which simultaneously relieved pain, swelling and fever. Both the products, ibuprofen and mebendazole, were in great demand both in the home market as well as in the export market. The company intended to export over 70 per cent of its production.

With this view the company had already received many offers from foreign importers for substantial quantities. It was also seeking clearance from the US Food and Drugs Administration so as to enable the company to export the product to the US.

The total consumption of ibuprofen in the world market is put at 8,000 tonnes. India's present market share was five per cent i.e. 400 tonnes. There is potential for India to export 2,000 tonnes. In the home market, the demand for the product is estimated at 1,500 tonnes while the supply was limited to 1,000 tonnes. There is thus already a shortfall of 500 tonnes. The annual growth for the product is put at 26 per cent.

In due course, the company would go for both backward and forward integration. SPCL's plant was coming up at Digwal village in the Medak district, 90 km. away from Hyderabad. The cost of the project was Rs. 615 lakhs. The equity for the project was 415 lakhs and the term loans Rs. 100 lakhs, each from State Bank of India and State Bank of Hyderabad. The company's cash outflow would be low on account of lesser dependence on term loans and it would be able to plough back at least 50 per cent.

Since export fetched higher price than domestic market, SPCL had drawn up plans to export more than 50 per cent of its output. The company would be entering the market on August 24 for NRIs and August 28 for Indian public to raise Rs. 308 lakhs. The company's board is headed by Mr. V.N. Nadkarni as Chairman and includes Mr. N.R. Pai, Mr. V.N. Subba Rao, Dr. K. Lahiri, Dr. Vishnu Padwal, etc.

TRENDS IN FOOD SCIENCE & TECHNOLOGY

'Trends in Food Science & Technology' is the proceedings of the IInd International Food Convention held at the Central Food Technological Research Institute, Mysore and organised by the Association of Food Scientists and Technologists (India) during Feb. 18-23, 1988. The 125 papers/abstracts embodied in this volume represent the edited versions of the papers presented by the respective authors at the 27 symposia and later submitted for publication.

These papers have been grouped into eight broad categories: 1. Food Technology — Emerging Trends, 2. Nutritional Aspects, 3. Food Materials — Storage & Processing, 4. Foods — Traditional, Special and Fabricated, 5. Food Quality, 6. Packaging, 7. Human Resource Development and 8. Technology Transfer, Industry and Field Application. These papers reflect the present status, current trends and developments as well as perspectives in the area of food science and technology mainly in India and to some extent in other developing and a few developed countries. Total pages 946 and (i to xvi), published in 1989. The publication is priced at Rs 300 (India) and U.S. $105 or £57 (including airmail charges also) or U.S $95 or £50 (by surface mail). For copies please write to the Secretary, AFST (I) CFTRI Campus, Mysore-570 013.

STANDARD ORGANICS

Standard Organics Ltd. has proposed to issue 1,83,600 fully convertible debentures of Rs. 100 each aggregating Rs. 1.84 crores on rights basis, the subscription for which is expected to open in October 1989.

Rs. 100-paid up debenture will be converted into equity shares in two stages. Firstly, the company will issue four equity shares of Rs. 10 paid up at a premium of Rs. 10 per share within one year of allotment, and secondly, one equity share of Rs. 10 each at a premium of Rs. 10 per share within one year. The company proposes to utilise the funds for its ambitious plans for growth, including backward integration — production of oxalates.

SOL PHARMA

SOL Pharma, part of the Hyderabad-based Standard Organics group, has announced a dividend of 13% for the nine months ended March 1989, that is 17.33% on an annualised basis against 15% paid last year.

The company achieved a turnover of Rs. 12.82 crores against Rs. 13.30 crores, an increase of 28% on an annualised basis and earned a profit of Rs. 79.60 lakhs before tax and depreciation against Rs. 65.65 lakhs.

After providing for depreciation (Rs. 10.43 lakhs against Rs. 13.03 lakhs) and taxation (Rs. 10.89 lakhs against Rs. 3.34 lakhs) the after tax profit is Rs. 58.28 lakhs against Rs. 49.28 lakhs, an increase of 58%.

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BICP report on drugs awaited

The Bureau of Industrial Costs and Prices (BICP) has been asked to make a fresh cost-cum-technical study of drug prices including those of vitamins, the Union Industry Minisster, Mr. J. Vengala Rao, told the Rajya Sabha. The Government, he said, would take steps to bring bulk drugs under price control as soon as its report was received.

Incidentally, this was perhaps the first instance this session when members, cutting across party lines, expressed concern over the sharp hike in drug prices and pulled up the Government for not safeguarding the interests of consumers, particularly the weaker sections.

Mr. Rao was at pains to assure the agitated members that the Government had the consumers' interests at heart. That was why in November last year, vitamin A and C were brought under the purview of the Drug Price Control Order (DPCO), 1987.

In reply to the main question earlier, the Minister of State for Chemicals and Petrochemicals, Mr. Namgyal, said that the prices of bulk drugs/formulations stood frozen as prevailing on November 18, 1988. However, he said the ceiling prices of formulations under DPCO were under notification and the prices of bulk drugs would be notified after receipt of the BICP recommendations based on its fresh cost study.

While Vitamin A and C have been brought under price control, no such step was being contemplated for all the other bulk vitamins, he said. Mr. Namgyal told Mr. Chowdhary Ram Sewak, who questioned why only these two vitamins had been singled out for price control, that vitamin A was an important drug under the antiblindness programme and vitamin C was consumed in large quantities. As such, there was no question of dicrimination, he said.

Mrs. Sarojini Mahishi criticised the lopsided policies of the Government and wondered how it expected the prices of vitamin formulations to come down especially when the prices of bulk drugs had not been brought under control. It was for this reason that prices of vitamins A and C have not fallen and thus the consumers' interests were being given a go-by, she said.

Moreover, following decontrol, imports of certain vitamins have increased and the State-owned Indian Drugs and Pharmaceuticals Ltd. (IDPL) was making a fast buck by selling the imported drugs at a higher price, she alleged. She wanted to know why prices had not been fixed by BICP even after the two vitamins were brought under DPCO and whether imports had increased.

Mr. Namgyal admitted that manufacturers had raised their product prices and the increase was as much as 50 per cent in some cases. However, these were later brought down to a reasonable level on the Centre's intervention. For instance, the price of vitamin A which was earlier Rs. 1,297 per kg rose to Rs. 2,400 after decontrol but was subsequently reduced to Rs. 2,100 a kg.

When Mr. M.S. Gurupadaswamy noted that it was evident that drug prices rose sharply after decontrol, Mr. Vengal Rao said they would be checked once the Government received the BICP report. Mr. G. Swamihathan was the lone member who pleaded the case of the manufacturers and said that for the industry to survive, there should be no control. In that case, at least, there would be no shortage of drugs, he said.

DRUG PRICES BEING REVISED

The Department of Chemicals and Petrochemicals has begun granting price increases to pharmaceutical units on the basis of the new conversion and packing norms. However, approvals are being given only to those companies which have submitted price revision applications for their entire range of products. The new conversion and packing norms have reduced allowance for process loss, while increases have been allowed on all other counts in view of rising costs.

After announcement of the norms, some units discovered that on high-value products, deductions due to process loss more than offset the gains due from revised norms. Applications of companies who sought price revision only on products in which they stood to gain have been kept pending. Price revisions are to be fixed for each individual pack size of formulations, which number about 20,000.

Meanwhile, price adjustments based on maximum allowable post-manufacturing expenses (MAPE) in the case of formulations have been completed, based on the old costs. However, prices of only about 60 bulk drugs out of a total of 120 under price control have been revised.

The Director of Pharmaceutical Division, Department of Chemicals and Petrochemicals, has agreed to recommend changes in import duty to remove anomalies that persist despite previous attempts at rationalisation.

The Government has accepted that duty on intermediates should be lower than that on the bulk drug. Wherever anomalies are established, duties are being reduced from a level of about 150 per cent ad valorem to about 90 per cent.

CARBIDE CHEMBUR PLANT TO BE OPERATIONAL SOON

The Maharashtra industries minister, Mr. Ramrao Adik, informed the state legislative council that the Union Carbide plant at Chembur, north-east Bombay, had been taken over by the Oswal Agro Industries and would be operational within a month.

Hoechst plans expansion

Hoechst India Limited,belonging to the United Breweries Group, is expanding the capacity of isoproturon technical manufacturing at its Ankleshwar (Gujarat) factory, with an investment of Rs. 9.8 crores. The proposal entails expanding the capacity from 400 tpa to 650 tpa and the investment wil be met by raising loans from financial institutions and internal accruals.

Isoproturon technical is an important wheat weedicide whose demand is increasing. During the last rabi season there was a shortage of this item it was stated by the company.

The expansion was initially objected to by a Bombay based firm called Gharda Chemicals Limited. It was contended that adequate capacity of isoproturon had already been created in the country and, therefore, there was no scope for additional capacity. The indigenous manufacturers are catering to the needs of the country, whereas Hoechst will be importing the intermediate required for the manufacture of the product, causing a drain on the scarce foreign exchange resources of the country.

Hoechst argued before the government that isoproturon was in short supply and that they were committed to manufacturing the product from the basic stage. The company also assured till the time they achieved production from basic stage intermediate required will be procured from indigenous sources.

The government at the end agreed with Hoechst's arguments saying there was scope for creating additional capacity. There was also a good export potential for this weedicide. Besides, large houses are eligible normally to take up the manufacture of the item. Another UB group company — Roussel Pharmaceuticals (India) Ltd. has also received government consent for the setting up of a new unit in Maharashtra for the manufacture of the following items: co-trioxazole (synastat) 3.25 mio tablets per annum; co-trimoxazole (synastat) suspension 50 ml — one lakh bottles per annum; cefotaxime sodium injections (claforan) 9 gm — 60,000 and cefotaxime sodium injections (claforan 250 gms — 90,000 vials per annum). No investment is involved in this project.

MODI ALKALIES

Modi Alkalies and Chemicals has shown an excellent performance during the 11-month period (1988-89). The company has achieved a capacity utilisation of 109% against 89% for the previous year and an industry average of 73%. The turnover has touched Rs. 30 crores (approximately) against Rs. 24 crores in the previous year, an increase of 35 per cent on an annualised basis. There has also been substantial increase in gross profit from Rs. 2.94 crores to Rs. 4.77 crores.

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Limestone deposits in Kashmir

Limestone deposits in the Kashmir valley, reported to be of high grade quality and suitable for cement manufacture, will be now investigated extensively for use in steel plants to accelerate establishment of mineral based industries in the State.

A joint venture of the National Mineral Development Corporation (NMDC) and Jammu and Kashmir Minerals Limited will be shortly launched in the State for this purpose. The areas to be investigated in this connection include Sandran and Bringi Valleys. Some areas of Jammu and Ladakh regions will also be investigated.

This information was given at a meeting of the State Geological Programming Board held recently under the chairmanship of the Industries and Commerce Minister, Mr. Moulvi Iftikhar Hussain Ansari. The meeting was attended among others, by Minister of State for Industries and Commerce Mr. Mohammed Ramzan, Deputy Director General, Geologial Survey of India (Lucknow), Mr. V.P. Sharma, Director GSI (Srinagar), Mr. K.P. Agarval, and Area Manager, Mineral Exploration Corporation (Jaipur), Mr. S.M. Hussain.

The meeting was told that gypsum deposits available in Assar, Parlanka —Thalwa and Kanga in Jammu region and the deposits at Uri would be utilised to meet the requirements of cement plants located in the Kashmir valley.

It was also revealed at the meeting that the use of lignite deposits at Nichhama for generation of thermal power through fluidized bed technology (FBT) was being considered by the Government. The Central Government has assigned the job of developing the project to a task force constituted for the purpose, which would be assisted by the Neyveli Lignite Corporation, Bharat Heavy Electricals Ltd., Mineral Exploration Corporation of India and the State Geology and Mining Department.

The meeting also reviewed the progress made in exploration of high unit value minerals like gold, tin and tungsten in the Ladakh region. Emphasising the significance of engineering geology, development of ground water and environmental geology, participants said that the Geology Department would continue its efforts and measures so that the ecological balance was not disturbed.

Sites for some dams and reservoirs would be identified so that the ground water resources would continue to develop in various identified areas of the State, the meeting was told. Environmental geology being important and vital in maintaining the ecological balance, it was decided that expert guidance would be sought to initiate effective measures in controlling landslides or rock-falls and soil erosion.

MINERAL OUTPUT DROPS

The country witnessed a fall in mineral production during May 1989 compared to the production in the preceding month. According to the figures available at New Delhi, the total value of mineral production (excluding atomic and minor minerals) in the country during May 1989 decreased to Rs. 1,148 crores from Rs. 1,160 crores in April 1989. During the month, the contribution of petroleum was the highest at Rs. 521 crores (45%), followed by coal (Rs. 395 crores), natural gas utilised (Rs. 101 crores), iron ore (Rs. 31 crores), lignite (Rs. 25 crores) and limestone (Rs. 23 crores).

Production levels of important minerals in May 1989 were: coal 15.3 million tonnes, petroleum (crude) 2.9 million tonnes, natural gas (utilised) 688 million cubic metres, lignite 1,086,000 tonnes, iron ore 4.4 million tonnes, manganese ore 105,000 tonnes, chromite 80,000 tonnes, bauxite 343,000 tonnes, copper ore 4,28,000 tonnes, gold 147 kg, lead concentrates 3,802 tonnes, zinc concentrates 10,232 tonnes, limestone 5 2 million tonnes, apatite and phosphorite 64,000 tonnes, dolomite 1,93,000 tonnes and magnesite 41,000 tonnes.

During May 1989, the production of petroleum (crude) recorded an increase of 3%, natural gas (utilised) 8%, lignite 14%, bauxite 25%, copper ore 6%, gold 36%, apatite and phosphorite 27%, and magnesite 10% as compared to the previous month. On the other hand, production declined in the case of coal by 8%, iron ore and manganese ore 7% each, lead concentrates 5%, zinc concentrates 10%, limestone 2%, and dolomite 3%. The production of chromite during May 1989 did not show much change. The index of mineral production (base 1980-81 = 100) works out to 201 thereby showing that the mineral production as a whole in May 198 decreased by 2.4% as compared to Apr 1989.

PETROCHEMICALS: WIIL KEE ON DOWNSTREAM UNITS

Against the backdrop of massive pe rochemical projects coming up in th country, the Western India Industri Ltd. (WIIL) is planning to hand medium-range downstream projects o turnkey basis and they have already in iated dialogues with some internatio ally renowned companies to have t latest technology. Disclosing this newsmen at Calcutta the WIIL Dire tor, Mr. Nandan Gadgil, said within year or so, the project would get off t ground. Considering the massive impa of big petrochem projects on the dow stream sector, WIIL has decided to en this sector in a planned way.

According to Mr. Gadgil, WI would be interested in medium ran projects where it would offer total p kages. In each of such downstream p jects, WIIL would participate in equ holding though not in a big way. H however, did not disclose the names foreign firms WIIL was negotiating technology collaborations. About the cation of such projects, he said the G would be the final authority in this pect. WIIL would be entering the c ital market on Aug. 28 with 10,75, equity shares of Rs. 10 each for cas premium of Rs. 7.50 per share.

Tripura methanol plant to be ready by 1992

The proposed Rs. 115-crore methanol plant with an annual capacity of one lakh tonnes at Shekharkote in Tripura under the Tripura Petrochemicals, a joint sector venture of the Oil and Natural Gas Commission (ONGC), Tripura Industrial Development Corporation and another promoter from the public sector or a private entrepreneur, is scheduled to be commissioned by 1992.

According to ONGC sources, the proposed plant in natural gas-rich Tripura would be the largest methanol plant in the country, consuming about three lakh cubic metres of gas per day and the process of conversion of gas to methanol would be far more economical than any other known methods of production of methanol. The sources also said that at present the total installed capacity in the country of methanol production is about 1.54 lakh tonnes per annum and the demand-supply gap is about 51,000 tonnes per annum which is sure to increase in the years to come.

The abundance of gas in Tripura (the prognosticated resource is estimated at 32 million tonnes in oil equivalent) promises a great future in rapid transformation of the economy of the State. Commercial accumulation of gas has been discovered by the ONGC in four structures of Baramura, Gojalia, Rokhia and Agartala dome where currently drilling for gas is continuing. Currently ONGC is supplying 70,000 cubic metres of gas per day to the Tripura State Electricity Department.

Three gas turbines five mw each are at present operating at Baramura with ONGC gas. By July 1992, a 75-mw power project at Rokhia utilising 7.5 lakh cubic metres of gas per day is expected to be commissioned. Meanwhile, gas supply has also been started to three brick kilns in the State. A feasibility report for a mechanised brick kiln using 30,000 cubic metres of gas per day has been prepared and a "gas promotional plan" to convert many coal-based ones at Jirania near Agartala has also been taken up.

The ONGC has started supply of gas to an industrial estate at Dukhi and also domestic gas to ONGC colony at Agartala. Soon gas supply to Agartala city for domestic purposes will commence. Work is in progress for a gas-based vanaspati plant that would use 10,000 cubic metres of gas per day. A five-tonne daily capacity cement plant for Tripura is also envisaged after the indication of limestone deposits in the state is noticed. ONGC also proposed to run all its rigs working in Tripura on dual fuel (diesel/-natural gas) after successful testing and commissioning of its 110 kva generating set to replace 70 per cent of diesel.

The proposed methanol plant is certain to bring in a new era of industrialisation in Tripura, as apart from conventional use of methanol in timber, furniture and construction industries, it is increasingly being used in bonded abrasives, insulation, friction materials, acetic acid, polyester fibre, film, insecticide and as a blending agent in gasoline to produce high octane unleaded gasoline and synthetic gasoline.

EXPORT TARGET FIXED AT Rs. 28,025 CRORES

The Commerce Ministry has fixed a tentative export target of Rs. 28,025 crores for the current financial year, representing an increase of 38.2% over the actual earnings of Rs. 20,281 crores in 1988-89. In terms of dollars, the projected rise is placed at 21.2%. The highest increase is projected for the export of chemicals and allied products. It is 116% — the exports are slated to touch Rs. 3,000 crores in 1989-90 compared with Rs. 1,338 crores in the previous year. This sector has done well and is expected to do better in the current financial year, according to the latest assessment of the Ministry. In the case of petroleum products, no increase in exports has been projected. The tentative target is Rs. 500 crores against almost the same level in 1988-89.

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Licensing may go for units with 100 per cent export obligation

The industry ministry has accepted, in principle, a suggestion that all units with 100 per cent export obligation be delicensed. Details in this regard are being worked out, according to official sources. The suggestion came from the Associated Chambers of Commerce and Industry (Assocham) at the first meeting of the board of trade held at New Delhi on May 29.

It has been made clear to the Federation of Indian Export Organisations (FIEO) that if any unit, other than small-scale, wants to export reserved items, it must export 75 per cent of its production. The industry ministry, however, can reduce this to 65 per cent on a case-to-case basis.

Besides, the government may allow export of items import of which is permitted under open general licence (OGL) if this results in a higher net foreign exchange earning. There is a suggestion in a paper prepared by the commerce ministry that a scheme of advance trading licences may be introduced in the new policy. Established exporters under this scheme would be issued advance trading licences for import and re-export of items on a duty-free basis with a minimum value addition of 10 per cent. Under this scheme, normal export incentives would not be given. However, such exports could be considered for the purpose of granting an export house or trading house status, the sources say.

The commerce ministry has made it clear to export and trading houses that they are free to enter into countertrade deals in respect of items which they are allowed to import and export under the current import-export policy. The government, however, is encouraging countertrade deals against bulk imports by government departments and public sector undertakings in order to augment foreign exchange earnings, apart from improving access for Indian commodities and manufactured items in new markets.

These relaxations are being considered by the government to increase exports in the coming years. For 1989-90, a tentative export target of Rs. 28,025 crores has been fixed. Against this, exports were worth Rs. 20,281 crores in the previous year and Rs. 15,719 crores in 1987-88. Exports are thus going up substantially.

While fixing the export tartet for the current financial year, the commerce ministry has taken into account four basic factors. These are: (a) access to intermediate inputs, components and, in some cases, capital goods has distinctly improved the competitive capability of the exporters.

(b) The cumulative effect of the various concessions given to exporters like duty drawback, cash compensatory support, concessionary interest rate, and income-tax exemption has reduced the differential between the profitability of domestic sales vis-a-vis exports. Although considerable progress has been made to reduce the relative profitability gap, domestic profitability is still higher than that of export for certain manufactured goods. Further policy measures would be necessary to increase the export bias.

(c) An exchange rate policy which is supportive of the other incentive measures; and (d) simplification of procedures governing the export policy.

PETROCHEMICALS IMPORT

The import bill for petrochemicals has progressively gone up from around Rs. 400 crores in 1986-87 to around Rs. 1,000 crores in 1988-89, minister of state for industry Mr. P. Namgyal said in a written reply.

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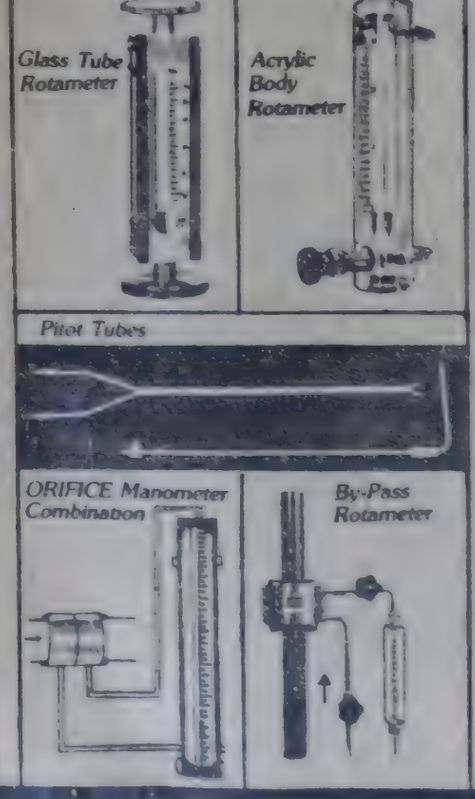

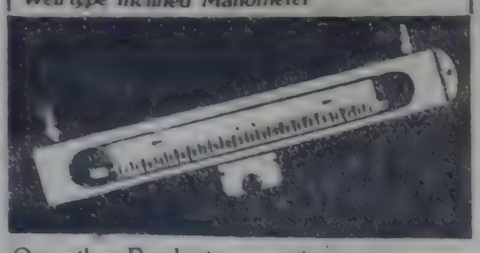

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JK group plans three major projects

The JK group is putting up three major projects one each in Gujarat, Uttar Pradesh and Orissa involving a total investment of Rs. 63.20 crores. Major chunk of which will be raised through debentures, and equity capital. Green signal for putting up these projects have recently been given by the government under section 22 of the MRTP Act. Large houses seeking to put up new projects and or effecting substantial expansion are required to obtain prior approval of the government under the above Act.

The UP project is for the manufacture of 7-ADCA at a cost of Rs. 4.20 crores: Orissa unit for PFY costing Rs. 37.50 crores and Gujarat plant for hydrogen peroxide with an outlay of Rs. 21.50 crores. Though for the hydrogen peroxide a number of units had already been sanctioned many of them could not commence production primarily due to difficulty in securing technology. But JK Industries Limited which is implementing the project seem to have succeeded in getting some technology and therefore there was no difficulty in getting consent from the Centre.

For the 7-ADCA project also, there was not much difficulty since only one or two companies are engaged in production of this item which is an intermediate for the manufacture of cephalexin, a delicensed item. It may be recalled that earlier last year the company's proposal for the manufacture of cephalexin monohydrate and 7-ADCA was rejected by the government as review of penicillin-G was being undertaken. But subsequently, the company had delinked this from the Penicillin-G application paving the way for approval of 7-ADCA project.

Of the total project cost of Rs. 21.50 crores for hydrogen peroxide, the company will resort to debentures, bank loans, FIs to the tune of Rs. 16.10 crores and contribute from internal accruals/ promoters share at Rs. 4.30 crores with the rest of the fund (Rs. 1.10 crores) coming as foreign exchange loan. The promoters holding in excess of 40 per cent of the equity in this project shall be divested within three years from the date of commencement of commercial production by an offer of sale at the prevailing market price to the general public.

The pattern of financing the 7-ADCA project is almost the same i.e. debentures/FIs/banks — Rs. 2.80 crores; internal accrual Rs. 84 lakhs and foreign exchange loan of Rs. 56 lakhs. For the Orissa PFY project, the company's proposals are: raising equity from the promoters (Straw Products Ltd.) and/or its associates) Rs. 5 croes, internal accruals Rs. 5 crores; loans from FIs Rs. 8-9 crores and foreign loan Rs. 16.08 crores. Howe government's directive the shall raise atleast 50% of the rupee borrowings through th debentures on the public on rig

While the Gujarat and Utta projects are being implement JK Industries Limited the thir be implemented by the Orissa tics Limited. Unlike the first jects, the Orissa proposal ha objections from the Synthetic Yarn Manufacturers' Associ grounds of viability and the threat to small units engage manufacture of polyester filan (PFY), since supply of the y excess of demand. The associa pleaded that this MRTP comp centrate on full utilisation of it ity for polyester staple fibre

The government however, view that diversification prop the JK will help in making its PSF plant viable through flexi product-mix between the PSF as is in practice with other co The government also took the v the project will result in bette tion of idle polymerisation capa lower investment per tonne for t ufacture of PFY. Besides, the ment needed will be far less t required for the setting up a g plant for PFY, whose demand is ing in the country.

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EXPORT ENQUIRIES SOLICITED

LI for GNFC to make formaldehyde

he Gujarat Narmada Valley Ferti- r Company Ltd. (GNFC) has been nted a letter of intent to manufacture 000 tonnes of formaldehyde. For- idehyde, a chemical used in making ination resins is produced from thanol. GNFC is implementing a -lakh tonne capacity methanol pro- t which is expected to be commis- ned by next year end.

The decision to go in for formalde- le appears to have been taken follow- the uncertainty about the acetic acid ject. While similar other units lementing massive methanol pro- s chose downstream products which not manufactured in India, the FC Managing Director Mr. Rama- an sought permission to set up a 000 tonne methanol-based acetic d project, rejecting the advice of sev- industry leaders as well as his senior icials within the company. Acetic 1 is produced exclusively from indu- al alcohol in India and there is no rtage of the material.

he letter of intent for the controver- acetic acid project has been con- ted into an industrial licence, but the nce Ministry has refused to sanction ase of foreign exchange to BP emicals, GNFC's technology colla- ator. GNFC's move to influence the ne Minister's office to expedite clearance was frustrated. The Department of Planning has also made adverse remarks on GNFC's proposal. There is a near-consensus in the chemical industry that the foreign exchange payment sought for the technology is too high and unjustified.

FOREX RELEASED FOR IMPORT OF CAPROLACTAM

The Union Government has released foreign exchange valued at Rs. 35 million for the import of caprolactam, the basic raw material for nylon filament yarn (NFY) and nylon tyre cord (NTC) industries. This will enable the nylon industry to import at least 25% of the annual entitlement of caprolactam.

The Union Finance Ministry is now considering the release of additional foreign exchange worth around Rs. 70 million with a view to meet the entire caprolactam requirement of NTC manufacturers and additional 25 per cent need of the NFY industry. The nylon industry's annual requirement of caprolactum is estimated around 86,000 tonnes, comprising of 44,000 tonnes for the NFY manufacturers and 42,000 tonnes for NTC makers. The Gujarat State Fertilisers Company (GSFC) is the lone producer of the caprolactam in the country at present and FACT, another producer is expected to come on stream early next year. The government has called a meeting of the caprolactam producers and consumers in October 1989 to review the caprolactam supply position in the light of the progress at the FACT plant. If the plant could be commissioned by Dec. 1989, the Government may reduce foreign exchange allocation to that extent for the import of caprolactam.

KRIBHCO-MANAGED HEAVY WATER PLANT TO BE COMPLETED BEFORE SCHEDULE

The Kribhco-managed Rs. 223 crores heavy water plant (Hazira Ammonia Extension Project) of the Union Atomic Energy Dept. is expected to be completed ahead of the scheduled completion date of Nov. 1, 1990. Talking to reporters at the Kribhco owned fertiliser plant at Kawas village, near Hazira about 16 km from Surat, Kribhco managing director, Dr. K.K.S. Chauhan, said that the project had been started on Aug. 1, 1986 and since then various plants including the water treatment plant, the cooling tower and air compressors had been commissioned. Reviewing the 3 years progress activities of the world's largest fertiliser plant managed by Kribhco on a cooperative basis, he said that Kribhco completed the third year of its commercial operations in 1988-89 with an excellent all round performance.

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Seminar on Metal Finishing for Electronics Industry

The Technology Advance Centre (TAC), Madras organised a seminar on Metal Finishing for Electronics Industry at Madras on August 9, 10 and 11. The TAC is a trust foundation to advance Science and Technology by utilising the expertise of eminent scientists and technologists in the country. The Centre has presently 50 such experts and aims to act as a Science and Technology bridge between manufacturers, R & D institutions and users of products and processes.

Prof. K.S. Hegde, former Vice-Chancellor, Mysore University inaugurated the seminar. He noted that the metal finishing industry has formed the basis of the electronics industry, whose development is continuing to be spectacular. Electronics industry is not only an earth-bound technology, but has moved into space. Its utilisation covers a vast area: from space research to domestic consumer utilities. There has been a phenomenal miniaturisation of electronic components, bringing about great savings in material use.

Padmashri R.V. Ramani delivered a special lecture on "Indigenisation". He observed how during the past fifty years India has emerged from an agricultural, mercantile economy to an industrial economy. In the forties only textile processing was a major industry of the country.

There were two considerations to be borne in mind in the process indigenisation. The indigenous product had to have adequate volume requirement, should be essential and not vulnerable to political and economical pressures.

Financial institutions have been insistent upon the import of proven technology. This implies that the technology has been worked abroad for atleast three years. Consequently the Indian industry lags behind — the bane of import of technology. India does n have the gumption of the Koreans, w try to effectively compete with the Ja anese in electronics.

The credit for encouraging India develop its own silicon technolo should go to our late Prime Minist Mrs. Indira Gandhi. Indeed pioneeri work in silicon tetrachloride has be done by the Indian Institute of Scien Bangalore. Amorphous silica is anot area, which offers wide scope.

Mr. Ramani cautioned against a to ban of hardware/software import. E the imported product should be o non-critical non-essential type, a should not occupy much space. T basics should be made indigenou Several bottlenecks, would have to overcome, but we should have the s confidence to develop our own techn ogy.

The inaugural was followed by s eral technical sessions, spanning th days.

ALEMBIC CHEMICAL

Alembic Chemical Works Co. reported a turnover of Rs. 85.97 cro for the ten months ended March, 1 against Rs. 90.17 crores in the pr ous year and has earned a gross pr of Rs. 364.08 lakhs against Rs. 34 lakhs. After allocating Rs. 152.95 la (Rs. 142.24 lakhs) for depreciat 32.60 lakhs (Rs. 30.15 lakhs) for ation and Rs. 87 lakhs (Rs. 22 lak for investment allowance reserve, t is a net profit of Rs. 82.65 lakhs aga Rs. 137.72 lakhs. The company announced an equity dividend of for 10 months against 18% for the vious year. The dividend will c Rs. 61.77 lakhs (Rs. 74.13 lakhs) a sum of Rs. 25.66 lakhs (Rs. 10 lakhs) has been transferred to ge reserve.

More petrochem units in MES scheme

The Union Government officially announced on August 4, the inclusion of eight more petrochemical industries in the scheme of Minimum Economic Scales (MES) of production and increase in the Minimum Economic Capacity (MEC) of 16 other intermediates which had been brought under its purview earlier.

Apart from these 24 items, the Government has also identified the by-products which are obtained in the manufacture of 21 main products for which MEC has been determined and announced.

A press note (No. 21 of 1989 series) issued by the Industry Ministry says that the Government will freely allow the manufacture of the by-products obtained in the production life of such identified items.

Endorsement, it says, will be made to this effect on the industrial licence while granting new facilities in respect of these industries. Moreover, no separate industrial licence will be required for the by-product if the industrial undertaking has a valid industrial licence for the manufacture of the main product. However, endorsement to this effect on the industrial licence would be necessary.

The following are the 21 products and the names of their by-products in brackets: Polyester staple fibre (methanol) when DMT is used polyester filament yarn (methanol) as raw material in both cases: PVC (chlorinated organic compoun s), DMT (methyl benzoate), Caprolactum (ammonium sulphate), LAB (heavy alkylate), Acrylonitrile (HCN, acetonitrile, ammonium sulphate), Styrene (toluene), MEG (DEG/TEG/PEG), Phthalic anhydride (maleic anhydride), Oxo-alcohol (n-butanol/iso-butanol), Propylene oxide/polyols (dichloropropane, dipropylene glycol), Naphtha/gas cracker (CBFS), Soda ash (modified Solvay process ammonium chloride), Sodium hydrosulphate (zinc hydroxide waste zinc process), Pentaerythritol (sodium formate), Toilet soap (glycerine), DAP (gypsum if phosphoric acid is produced captively for DAP), Phosphoric acid and SSP (hydro glusilic acid), Vanaspati (soap stock/acid/oil oxygen glycerine and fatty acids), Sugar (bagasse, pressmud and molasses).

The following are the 16 items with revised MES and the existing MES in brackets:

Polyester staple fibre (30,000) 60,000, Polyester filament yarn (15,000) 25,000, Industrial yarn (12,000) 15,000, Acrylic fibre (12,000) 20,000, LDPE (90,000) 1,00,000, LLDPE (60,000) 80,000, HDPE (50,000) 1,00,000, Polypropylene (50,000) 1,00,000, Polystyrene (30,000) 40,000, ABS (5,000) 20,000, PTA (1,00,000) 2,00,000, LAB (60,000) 80,000, MEG (60,000) 1,00,000, Phthalic anhydride (15,000) 20,000, Propylene oxide/polyols (12,000) 25,000 (chlorohydrin route), SBR (80,000) 1,00,000.

The following are the eight items for which MES has been fixed for the first time:

Name of the article	Minimum economic capacity (tonnes per annum)
Naphtha/gas cracker	3,00,000 to 4,00,000 in terms of ethylene
EPDM	10,000
Alpha Olefin	1,00,000
Butyl Rubber	25,000
Polybutene	5,000
VAM	10,000
BOPP film	5,000
Polyester film	5,000

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PETROCHEM COMPLEX AND OTHER PROJECTS

Rs. 10,000-cr. investment in Hazira planned

An investment of more than Rs. 10,000 crores is being planned at Hazira near Surat in the petrochemical complex and down stream units as well as other projects. The Union Govt. has cleared a 100 per cent export-oriented unit for the manufacture of HR sheets and coils to be set up near Hazira at the cost of Rs. 1,300 crores. The unit will have a 180 mw power generating plant for captive use. Further, the long awaited sponge iron and petrochemical complex has also been cleared by the Centre. This was stated by Gujarat Chief Minister Mr. Amarsinh Chaudhari while talking about new incentives offered by the latest industrial policy of the State Govt. to set up new units and expansion of the existing units in Gujarat at a meeting organised by the Indian Merchants' Chamber at Bombay on August 4.

Providing a brief overview of the industrial scenario and emerging opportunities in Gujarat, he hinted that there will be very good availability of gas for power generation as well as industrial purpose. The commitments made last year alone for gas based power stations include a major project of 600 mw by NTPC at Kawas near Hazira and power projects of the Ahmedabad Electricity Board and Gujarat Electricity Board. The first ever power generation project in the co-operative sector to generate 145 mw power is taking shape at Vadodara. Thus, Gujarat's power supply would stand augmented by more than 1000 mw because of availability of gas. Now two major power plants of 600 mw are being cleared for Bharuch and Pipavav. An investment of over Rs. 2,000 crores is being made to generate at least 2,000 mw of power in Gujarat within the next few years. Mr. Chaudhari was confident that Gujarat will not have any problem to provide the necessary power for the new industrial projects which will be coming up in future.

The State has also been successful in attracting new investment at other locations. A major tyre project with an investment of Rs. 200 crores is taking shape near Vaghodia, whereas Valia has attracted major chemical projects like alpha olefine, petrofils etc. A Rs. 250 crores float glass project is the latest addition to this area. GIDC is currently developing a major industrial estate at Vagra near Bharuch to accommodate the demand of major projects, he added.

The Gujarat chief minister informed the industrialists that the State is aware of the infrastructural facilities needed for rapid industrial development and assured them of adequate and efficient telecommunications, roads and power facilities. He said the State also proposes to separate Wadinar from Kandla port and develop it as an international port suitable to handle all types of cargo.

He said Gujarat is the first state in the country to go in for the construction of an autobahn at a cost of Rs. 140 crores, linking Ahmedabad and Baroda. It has now been planned to extend this up to Bombay covering industrial belt of Bharuch and Surat and passing through Vapi. This will open up more areas for Bombay-based entrepreneurs.

There is another proposal for constructing a pipeline-cum-bridge project linking Saurashtra with south Gujarat across the Gulf of Cambay. This will reduce the distance between Saurashtra and Bombay by more than 500 kms and reduce the travelling time by 10 hours, besides achieving great economy in transportation costs, Mr. Chaudhari added. He also referred to the facilities available for the development of electronics and diamond cutting and polishing industries.

Gujarat intends to prepare a perspective plan keeping in view the growth opportunity and potential during the next 20 years, and a group is soon expected to be appointed to undertake this assignment. He also referred to the benefits of the Narmada projects and stated that the critics of this presitgeous multi-purpose project appears to have never seen the site and area. The state is trying to counter the wrong propaganda, he said. A Gujarat Bhavan is being planned in Bombay to provide information and assistance to industrialists and others, he added.

In his welcome address, Mr. Rohit Patel, president of the chamber, referred to the problems faced by the industrialists with regard to high cost of power, and inadequate transport and telecommunication facilities.

ONGC PLAN FOR LPG PLANT IN THANJAVUR

The Oil and Natural Gas Commission is preparing a feasibility report on setting up an LPG (liquefied petroleum gas) plant in Tamil Nadu and deciding on various parameters of the plant, according to the ONGC sources at Madras. The plant is expected to be located in Thanjavur district. The ONGC has already struck free gas in the Cauvery offshore basin at a well called PY-1-8. The yield from this well may go up to 1 million m^3 of gas a day. There was a significant oil find at another well, PY-3-2, which yielded about 15,000 barrels a day and also a substantial amount of associated gas. Oil and gas from both these wells may be produced by April 1992.

The ONGC has conducted tests in a well it drilled at Adiakkamangalam village in Thanjavur district in the Cauvery onshore basin. Some more important tests remain to be done before declaring whether the well will yield hydrocarbons. The Ravva structure in the Krishna-Godavari offshore basin, consisting of two offshore platforms, is currently being developed by the ONGC. Production of oil and gas from this structure will begin by 1991/92. While the first phase of development will yield about 8,400 barrels of crude a day, the second phase will yield about 20,000 barrels a day. The ONGC, southern regional business centre, has set up a working committee of representatives from the industry and ONGC officials to identify the consumers for gas that will be produced from the Cauvery Basin.

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Roha chemicals complex suffers huge loss

Widespread damage to machinery, an almost total wash-out of the necessary raw material and finished goods stocks and complete disruption of communications due to floods in the last week of July have thoroughly immobilised the massive chemical industry complex at Roha.

The 40 units in the MIDC industrial area, most of which manufacture chemicals and have an investment of about Rs. 100 crores, will not be able to resume normal production for at least three weeks. Their repairing and reconstruction work has been hampered further by the transport strike and the mess in the road and rail transport network.

The units which suffered extensive damage in the area belong to Colour-Chem, Excel Industries, Dharamsi Morarjee Chemicals and Caprihans India. Units of Sudarshan Chemicals, Nirlon, Bombay Dyeing and others have also suffered considerable damage.

The "Black Monday" (July 24) brought the flooding Kundalika river right inside the plants in the early hours, catching the skeleton third-shift staff unawares. Even before they could grapple with the problem, the water level, had risen by 8 to 12 feet above ground level, creating a huge aquatic barrier and forcing workers to the second floor. Many of the buildings being single-floored, employees just had to rush to the roof top at 5 a.m. and stand there for the next 10 hours, getting drenched and watching the office records, furniture and drums full of chemicals being washed away.

The water level rose so rapidly that the factory walls gave way in the eaarly stages itself. The most important casualty of the gushing water was 1000-foot boundary wall of Colour-Chem, right on the bank of the river. Even as the dazed employees of the factory rushed to the phone, the entire factory was engulfed by the gushing waters. All employees and factory records, computers and electric motors were destroyed.

According to Mr. Prakash Malik, general manager of the company, though MIDC and MSEB have staged an exemplary post-disaster performance in restoring power and water supply, it would take another 10 days to clean the shop floor and equipment.

However, even if the plant was ready, in the continued absence of a firm road link to Roha, they would be constrained by the non-availability of raw materials. Right now, a 100-km detour is being made to bring in the raw materials stock.

The detour is also quite expensive, apart from being time consuming. Colour Chem has suffered an estimated loss of Rs. 10 crores. The company has also reduced the working hours of the workers to six-hour shifts, who, according to Mr. Malik, also have to attend cleaning of their houses. Workers have also received monetary assistance from the company, he said.

Indeed, the entire industrial complex has risen to the occasion, not only to salvage factories but also restore the town of Roha. Mr. B.V. Gandhi, general manager of Excel's plant said that the tragedy had caused a loss of Rs. 1.5 crores to the company.

According to him, the entire complex has suffered a loss of about Rs. 50 crores —about Rs. 25 crores in terms of capital loss and Rs. 25 crores in production. However, he said, there was no loss of life in the industrial area.

Mr. Gandhi, who is also honorary secretary of the Roha Industries Association, said the state government, financial institutions, MIDC and MSEB had been extremely co-operative. The association representatives had met the chief minister, Mr. Sharad Pawar, and appraised him of the situation.

In a memorandum submitted to the chief minister, the association has demanded immediate restoration o transport and communication systems disinfecting and cleaning of the whol area, waiving of certain procedural for malities at octroi and municipal chec points and financial assistance in restor ing equipment. The chief minister ha asked the financial institutions to pre pare a package of assistance for thes units immediately.

The industrial units have als declared that there will be no lay-off c the workers. They have undertaken co ordinated relief work, beginning wit their workers and to be extended to th village later.

The Kundalika River has divided th township around the complex in Roha and Ashtami villages. The com plex itself is located on Roha side (Dhatav). The hazardous nature of th manufacturing activity has kept th workers on the other side of the rive which is at a lower level and is, ther fore, completely destroyed. Excel's M Gandhi estimated that the residents the two villages must have lost abo Rs. 30 crores, while the workers in t industrial complex about Rs. 25 cro of their personal belongings, apart fr the industrial loss.

At Patalganga, off the Bombay-Pu highway, the Rs. 1,700-crore pet chemical complex of the Relian Industries Ltd. was the worst affect it being closest to the river. Reliance said to have lost more than Rs. 1 crores in equipment and is losing ab Rs. 3 crores every day in productio The prestigious complex manufactu LAB, PSF, PFY, Paraxylene and PT Finished PFY and PSF were strewn and around the plant. Mud and deposits on machinery and huge s tions of broken wall made an eerie sig The chief executive of the compl

K.K. Malhotra, said that all the 0-odd motors in the complex had n submerged under water with nsive damage to them. With the var- s plants under 4 to 10 feet of water,- st of the records and control ipment, including computerised con- instrumentation, computers and er electronic equipment were seri- sly affected, he said.

hough Mr. Malhotra projected an timistic 8 to 10 days for restart of ope- ions in all the plants, expert observ- s at the site felt that it may not be sible in view of the extensive mage. Among other plants which suf- ed seriously due to the flash floods ere Indrol Lubricants, Bombay veing, Alkyl Amines and Jaysynth yechem, INOX and Bakul Aromatics. pla and Orkay plants were among the w plants which were not affected by e flood as they were located on the gher levels of the saucer-shaped area.

Bombay Dyeing's DMT plant has st Rs. 3.5 crores in production and an estimated amount in equipment hough not very damaged). However, restarted operations from August 6, cording to a spokesman of the com- any. Jaysynth Dyechem suffered a loss f Rs. 1 crore, including 25 tonnes of nished disperse dyes and reactive dyes hich were ready for export. The lant's works manager, Mr. N.M. Ram- chandran, also informed about loss of ontrol panel equipment, colour match- ng systems and computers. He also said hat the entire flooding had taken place within 40 minutes — between 7.15 and .55 a.m.

The story was no different at Alkyl Amines which has estimated a loss Rs. 1 crore, and Indrol, which is yet to stimate its losses. Both companies will remain inoperational for quite some ime, their officials said. At Nagothane, though the town has been completely wiped out, the prestigious IPCL com- plex has remained unaffected. The com- pany's spokesman said that despite the devastation to its neighbourhood, the plant will become operational on sche- dule in November-December, this year.

Courtesy: Economic Times

CHAMBAL FERTILISERS

The gas-based fertiliser project being set up by Chambal Fertilisers and Chemicals has made progress. The company has been promoted by Zuari Agro Chemicals of the K.K. Birla group.

The project is being set up at a new site near village Gadepan, about 35 km from Kota (Rajasthan). The site had to be changed from Sawai Madhopur because of the revised guidelines laid down by the ministry of environment and forests. The new site has been cleared by the state and central governments and approval of the ministry of environment and forests has been received. The project, which is estimated to cost Rs. 764 crores, will be financed by way of equity capital of Rs. 152.80 crores and term loans of Rs. 611.20 crores.

The Industrial Development Bank of India, which appraised the project, has agreed in principle to provide term loans both in rupees and foreign currencies to the extent of Rs. 511 crores. The balance amount of Rs. 100.20 crores will be financed by commercial banks.

A certain portion of the share capital, reserved, out of the promoters' contribution, for Zuari shareholders, has been offered to them on private and preferential basis. Zuari Agro has already contributed Rs. 18 crores towards the capital of Chambal Fertilisers.

The contract with Snamprogetti of Italy, the prime contractors for the project, has been taken on record. Possession of 258 hectares of land allotted by the state government has been taken.

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OMATICS

The price of efficiency

recent study by the Bureau of istrial Costs and Prices analyses in il the relative prices of aromatics. n aromatics to intermediates to nstream products, Indian prices are far more expensive.

any study on the harmonisation of sing with tariffs, an examination of modity price movements is an ntial element. With aromatics con- ting the basic building block for y intermediates and downstream lucts, such an examination is even e important. An attempt has been e to undertake an integrated anal- of the prices of aromatics together those of the feedstocks (crude and tha). To provide a comparable pic- the analysis has been provided for international and Indian prices.

or the analysis of international es, data on spot prices of naphtha, zene, toluene, paraxylene and oxylene published in the European mical News have been adopted. For e prices, the weighted spot assessment of OPEC crude published in Indian Petroleum and Natural Gas Statistics has been used. As the data shows, there is a remarkable stability in the relative prices of aromatics with reference to crude and naphtha prices, as reflected in the parallel movements of prices. The only exceptions are benzene and paraxylene in 1987.

It would be interesting to see how the relative prices behaved in India. For this purpose, the prices of indigenous crude oil and non-fertiliser naphtha have been adopted along with the basic selling prices of aromatics as reported in the manufacturers' replies to the BICP questionnaire. For the purpose of this exercise, two prices have been taken —one, the basic selling price and the other, the selling price with excise duty. It is seen that in India too, there is a stability of relative prices.

The differing scales and units for international and Indian prices somewhat restrict their utility to provide a comparison of relative prices. The inter-

Crude comparisons

International prices of crude and petrochemicals (US$/tonne)

r	Crude oil	Naphtha	Benzene	Toluene	Para xylene
0	255	316	495	410	596
1	231	329	524	419	673
3	211	274	441	335	546
4	201	250	391	308	500
5	192	245	400	336	491
6	78	128	254	215	401
7	130	162	406	243	336

ndian prices of crude and petrochemicals (without duty) (Rs./tonne)

3	1340	2792	6900	4963	-
4	1480	2792	6944	4963	-
5	1513	3106	7700	5704	-
6	1513	3211	7401	5704	-
7	1763	3211	7700	5704	-

relationship among the prices of various items can be studied in the form of matrix of relative prices. Considering the prices of one item (say crude) as the standard, the prices of the items following can be expresssed as ratios to the standard.

It is seen that international relative prices are lower than Indian relative prices, both without and with excise duties. The implication of higher relative prices in India is that even if raw material (naphtha) is made available at international prices, the Indian price of products (benzene, toluene and xylenes) would still be higher than their international prices, given the present situation in India.

The possible reasons for this are: deliberate depression of international prices of products, pricing policy adopted in India, scale of operations, higher cost of inputs other than naphtha.

On the first reason, while it is true that deliberate depression of prices does take place in international trade, it is to be noted that the price ratios worked out are averages asked on spot c.i.f. prices relating to a relatively longer period of 7 years. Short-term depression of prices cannot be expected to affect them unduly. Moreover, the parallel movement of prices of different items would imply that price depression, if existing, was prevalent for all items which may not be the case. For these reasons, it may be concluded that the international ratios adopted indicate stable relationships.

As regards pricing policy, prices of petroleum products in India are fixed by the ministry of petroleum and natural gas on the recommendation of the oil coordinating committee. In brief, the price-mechanism followed is based on a cost-plus principle. Retention price is based on the delivered cost of crude, normative cost of refining based on standard product-mix, a pre-fixed ratio of return on net worth and average interest on borrowings. Prices are fixed

normally for a period of three to five years; the escalation clauses take care of changes in import prices.

For different petroleum products, price is worked out by allocating the total normative cost of production to individual products by applying certain specified indices for different products. Social aspects like mass consumption as in the case of kerosene and economic aspects like the international price level are taken into account while calculating the indices, apart from technical and operational considerations.

Prices of aromatics like benzene, toluene and xylenes are fixed by the manufacturers themselves. It is, however, seen that prices are changed more or less simultaneously at intervals by all producers.

The Oil Coordination Committee does not generally recommend prices for aromatics, unless specifically requested to do so. From this, it would be seen that Indian prices of aromatics, although not fixed by the government are also not entirely market-determined.

The capacity of plants in India are still small compared to world standards. The largest capacity for benzene is in BPCL with 85,000 tonnes and the proposed unit of CRL will have a capacity of 87,200 tonnes. In the world scene, the plant size is higher and is still going up. Among the plants under erection during 1982-86, as many as 72 per cent had capacities above 100,000 tonnes as compared to 55 per cent among the plants erected during 1972-73.

The earlier analysis compares relative prices of aromatics to crude and naphtha. A comparison of absolute prices in Indian and international markets for three points of time has also been attempted. This is because during 1988, the demand for aromatics in the world remained strong and supplies tight with consequent spurting of prices. It can be seen that:

* C.I.F. prices in US dollars of aromatics have increased considerably during the ten-month period January-October 1988.

* As against this, basic prices in India of naphtha and aromatics have remained unchanged during the period.

* Consequently, the ratios of Indian to international prices have declined sharply for all items. Despite this, Indian prices were more in October 1988 for all items excepting paraxylene.

* A comparison of prices including excise-customs duties for all the items is less in October 1988. This would indicate that the rise in international prices has made domestic production more attractive.

A matrix of relative prices

Relative price of	Crude	Naphtha	Benzene	Toluene	Paraxylene
to					
International					
crude	1.00	1.31	2.46	1.92	3.01
Naphtha		1.00	1.88	1.46	2.29
India (without excise duties)					
Crude	1.00	1.99	4.84	3.57	-
Naphtha		1.00	2.43	1.79	-
India (with excise)					
Crude	1.00	-	-	-	-
Naphtha		1.00	2.99	2.36	-

The overall position was that dom tic naphtha prices corresponding to c prices was only 60 per cent higher; b zene was close to the c.i.f. price, pa xylene was surprisingly cheaper. T favourable turn was primarily due to sharp rise in c.i.f. prices of aroma which was quite contrary to the observed in crude oil prices. This uation is unlikely to hold in futur

DEMAND FOR PLASTICS PIC UP

The downtrend in international pr has triggered off increased consump of plastics, according to indu observers. The growth rate of low sity polyethylene, which showe decline last year, is expected to gro a faster rate this year.

Traders have begun large- imports of polyvinyl chloride (P the largest consumed polymer in I now that prices have somewhat s lised around $700 a tonne. City-b traders opened letters of credit at in the last week of July. Argo material is available at even ch rates.

The landed cost of PVC has below Rs. 24,000 a tonne wh cheaper than Indian Petrochem Corporation Ltd.'s price of Rs. 25,000. IPCL's price is the c est among all Indian produce average price being Rs. 26,500.

While producers say the dow in prices offers a golden opportun developing new applications, pro feel that at least in the case of where there is no monopoly of c tic producers as in the case of there is a case for revision of duty.

IPCL's plants in Baroda are meantime running full steam three hour-long power trippi rupted production in the last w July.

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BABRALA FERTILISER PROJECT

TFL to re-examine financial viability

Tata Fertilisers Limited is re-examining the financial viability of its Babrala gas-based fertiliser project in view of the proposed changes in the retention price norms. The company has indicated this in a letter to the government in response to an inquiry as to why no payment has been made to Snamprogetti for the process licence and services contract. Normally the zero date for the project should have commenced with this payment.

The company has told the government that the payment has been withheld in view of the financial viability review of the project undertaken by it. This implies that the company may drop the project if it finds the new norms too harsh or the proposal less attractive financially. The letter of intent for the project was issued to Tata Chemicals Limited who formed the new company, Tata Fertilisers Limited, for the implementation of the project. The capacity of the project is 1350 TPD (tonnes per day) of ammonia and 2250 TPD of urea. The project is estimated to cost Rs. 750 crores.

Initially the project was delayed as the promoters wanted to modify the product pattern by including soda ash and ammonium chloride alongwith ammonia and urea. This proposal, which was made in Feb. 1987, was examined by the government in consultations with the concerned departments and ministries.

Between the receipt of the proposal and communication of the final decision by the government in this regard, there was a time-lag of about eight months. However, even at the time of making the proposal, the company had assured the government that it stood committed to the product pattern indicated in t letter of intent. When the proposal w rejected, the promoters agreed implement the project according to t original letter of intent. According to t information available with the fertilis department, the promoters have take steps for land acquisition, getting clea ance of the state pollution control boar and environment clearance from t ministry of environment and forests

They have also obtained the go approval for their collaboration agre ment with Snamprogetti and for t carbon-dioxide removal process. T promoters have now given a propo to merge Tate Fertilisers Ltd. with t parent company, Tata Chemicals Lt with a view to improving the financ viability of the project. Governm approval, in principle, to this also h been given. The legal formalities, ho ever, are expected to take some ti before the merger takes place. The p moters have indicated that it is only a the formalities, the initial payment un the contract will be made and the z date for the project notified.

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INDO GULF FERTILISERS

Indo Gulf Fertilisers Ltd. has repo encouraging working results for 15-month period ended March 31, 1 and the directors have proposed to a maiden equity dividend of 15 per for the period under review. The c pany has achieved a turnover Rs. 12.12 crores as against Rs. crores in the previous year, and g profit of Rs. 2.23 crores (Rs. crores). Profit after depreciation interest works out at Rs. 86.29 lak against Rs. 9.46 lakhs last year. company hopes to utilise the licensed capacity of 45,000 TPA a turnover of nearly Rs. 50 crore 1991-92. Inspite of stiff compet with the established giants, the com has been able to establish its pr very well and in a short span of 3 of production has carved out a nic itself in the field of explosives.

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ARMS-AC-9/89

Phosphoric acid worth Rs. 350 crores to be imported

The Minerals and Metals Trading Corporation has contracted to import 5 lakh tonnes of phosphoric acid valued at Rs. 350 crores from the US and European sources in a bid to end the uncertainty of phosphoric acid supplies to the fertiliser industry. The first consignment of 50,000 tonnes has already arrived.

According to informed sources, MMTC was able to wrest a price of $432 per tonne of phosphoric acid despite a worldwide shortage and higher price. The price of phosphoric acid was ruling around $525 per tonne only a few weeks ago.

A number of fertiliser units such as Zuari Agro, Gujarat State Fertiliser Corporation, Paradeep Phosphate, Hindustan Lever, etc. making diammonium phosphate (DAP) had to close down since last February as the shipments of phosphoric acid had come to a halt.

India almost totally depends on import for its 1.6 million tonnes requirement of phosphoric acid every year. Four companies, namely Rashtriya Chemicals and Fertilisers, GSFC, SPIC and Fertiliser and Chemicals Travancore, however, produce three lakh tonnes of phosphoric acid indigenously. This is hardly sufficient for their own consumption.

The sources said that the government had to almost stop the import of phosphoric acid last year as the exporting countries, namely the US, Morrocco, Tunisia and some European countries, formed a cartel and started jacking up the price of phosphoric acid to unviable levels for the fertiliser industry.

It was in this context that the government decided to import 23 lakh tonnes of DAP instead of importing phosphoric acid so that a shortage of DAP could be avoided during the kharif season. With the supplies of phosphoric acid having resumed now, the closed DAP units have restarted their operations. MMTC has assured an uninterrupted supply of the acid to the fertiliser units now, the sources said.

Although the availability of DAP may not be affected during the current kharif with the restarting of closed DAP units and the planned import, a shortage of singe superphosphate (SSP) is persisting in the western and southern parts of the country.

Production of SSP has not reached the normal levels as the availability of rock phosphate continues to be irregular. Fertiliser industry depends to the extent of 70 per cent on imported rock phosphate. The total requirement of rock phosphate in the country is placed at nine million tonnes.

Shortage of phosphatic fertilisers started in the beginning of last rabi season owing to shut-down of several SSP units in different parts of the country due to irregular and inadequate supplies of rock phosphate.

Rock phosphate supplies were affected mainly on account of port congestion and labour problems at the docks towards the end of last year. Another reason for the poor availability of rock phosphate was the wet conditions in Udaipur. Rains had virtually stopped the procurement of indigenous rock phosphate during August and September last year.

Although the situation in the ports and Udaipur has improved, all the SSP units are still not able to produce to full capacity.

Meanwhile, the demand for SSP and DAP is expected to go up considerably in the coming months particularly during September-November with the starting of sowing operations.

FERTILISER COMPANIES CONFIDENT OF MEETING DEMAND IN WB

Fertiliser companies selling their pr ducts in West Bengal are confident meeting the kharif season's fertilis demand due to the current rainfall whic has been farily widespread in the stat The kharif allocation for the state h been of the order of 1.6 lakh tonnes nitrogen. In terms of urea, the quanti comes to about three lakh tonnes. Di ferent fertiliser companies are alrea holding a stock of over two lakh tonn of urea in their field godown. Hindust Fertiliser Corporation is holding a sto of about 60,000 tonnes, Benfed, t marketing co-operative of the state g ernment, around 70,000 tonnes, IFFC about 40,000 tonnes and KRIBHC about 15,000 tonnes.

Fertiliser Corporatiion of India a Indo-Gulf Fertilisers too have so stocks in their different field godow Capping it all, there is carry over st of imported material to the extent 14,000 tonnes.

As the Durgapur unit of HFC has been functioning since March this y there was apprehension that H which accounts for the bulk of the tiliser supply in the state, will fin hard to meet its commitment. Howe the fear has been unfounded.

Apart from the sizeable stock i holding in different field godowns, H has entered into an arrangement v Rashtriya Chemicals and Fertili whereby it will be able to market R products over and above the gov ment allocations to RCF for this for the current kharif. HFC is moving products from its Namrup p An allocation of 50,000 tonnes has made for West Bengal from the Nam plant, of which about 37,000/38 tonnes have already been despatc The current stock of Namrup produ the state is estimated at 18,000 to

Science Briefs

ARC MAINTAINS CLAIMS ON OLD FUSION

While world over the claims made a ouple of months ago, that cold nuclear usion of deuterium nuclei, a heavy iso- ope of hydrogen, could be achieved with modest table-top experiments, seem to be slowly dying out, scientists of the Bhabha Atomic Research Centre (BARC) have continued to stick to their earlier claims and believe that what they observe in their experimental set-ups is certainly cold fusion.

Cold fusion refers to possible fusing of light nuclei like hydrogen and its isotopes — deuterium and tritium — at room temperatures in contrast to fusion processes in stars like the Sun at temperatures of billions of degrees centigrade and in the billion dollar exercises till now to simulate this in controlled conditions in huge laboratory set-ups.

"There is certainly cold fusion; what is lacking is an explanation for it. But it is not an inexplicable phenomenon", Dr. P.K. Iyengar, Director of the BARC, said. "We have seen effects of fusion both in heavy water electrolysis and high-pressure experiment mainly with titanium as the deuterium absorbing metal. Heat generation is probably there but what is significant is we see the fusion by-products, neutrons and tritium, in our experiments," he said.

Widespread scepticism

The above assertion of Dr. Iyengar notwithstanding, the initial excitement and enthusiasm among scientists all over the world — which all began with simple electrochemistry experiments of electrolysis of heavy water carried out by Drs. Stanley Pons and Martin Fleischmann at the University of Utah, U.S. and by Dr. Stephen E. Jones and company at the Brigham Young University, U.S. in February — about a possible cheap source of energy has certainly given way to widespread scepticism.

The state of affairs can be best judged from the editorial comment in a recent issue of Nature: "It seems the time has come to dismiss cold fusion as an illusion of the past four months or so". But Dr. Iyengar is far from dismissing BARC's findings as any kind of illusion. It must be pointed, however, that the BARC experiments were not part of the 83 experiments from all over the world that were reported in the most substantive conference on cold fusion that took place in Santa Fe, U.S. between May 23 and 25. Dr. Iyengar, however, said that he presented the results recently at a conference on "Emerging Nuclear Energy Systems" in Karlsruhe, West Germany.

No theory to fit data

According to a summary of the conference, there had been roughly equal number of papers with positive and null results. Pointing out that the so-called positive results had many explanations, it said that one did not have a theory that fitted all data. The equivalent question it posed was: "Does anyone have a theory that will allow two deuterium nuclei to come close enough together that they have a good chance of fusing?"

Stating that most, though not all, workers in the field realised that cold fusion will never be of any practical use for power production, it went ahead to remark: "Of purely academic interest is the question whether there exists cold fusion at some very low level (a billionth or a trillionth or a billionth-billionth of a watt)? Clearly Utah level is excluded by the data, but some hope it might occur at the BYU level, but again there are good experiments which find no neutrons at much lower levels".

BARC experiment

The curious fact about the BARC claim is that one is not talking here of

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low levels of neutron bursts, which are difficult to be distinguished from fluctuations in the cosmic ray neutron background (with a rate of about one neutron/min.). "We do not have to worry about going underground like the French or build shields against the background. Our neutron bursts are ten thousand times the background. This is the count in the high-pressure experiment. Levels in our electrolysis experiments are much lower," Dr. Iyengar said.

The electrolysis experiment of BARC uses titanium instead of palladium in the Pons-Fleischmann set-up. The high-pressure experiment, on the other hand, is conceptually similar to the Frascati experiment of Prof. F. Scaramuzzi and also uses titanium. Similar experiments have also been performed by Dr. Howard Menlove of Los Alamos Laboratory. However, the neutron counts of both these experiments are far below the BARC claims. They would seem to be more consistent with BYU levels of neutron generation. While Prof. Scaramuzzi sees very short neutron bursts (lasting few microseconds) with rates of tens of neutrons/second, Dr. Menlove sees 100 microsecond bursts of 10 to 300 neutrons/sec.

The underlying principle in the high-pressure experiment is high-temperature degassing of hydrogen locked in titanium by heating it to about 200°C and more and then pumping in gaseous deuterium under pressure of four to five atmospheres only. (Dr. Menlove used upto 50 atm. pressure.) On cooling one sees bursts of neutrons. This, according to Dr. Iyengar, is due to fusion of deuterium nuclei as the titanium metal lattice rearranges itself as it cools.

Fusion process

To fuse the deuterium nuclei have to overcome the electrostatic barrier between them created by the force of repulsion between the positively charged protons in their nuclei. Dr. Iyengar also believes that he has some kind of 'hand-waving' argument for the fusion process which aims to explain why this occurs only in solids, like titanium or palladium, and not in free space.

"The fact that we see more tritium than neutrons in our experiments is important for this explanation", Dr. Iyengar says. Deuterium fusion proceeds through two modes: one giving rise to tritium as by-product and the other to neutrons. Under normal conditions these proceed with roughly equal probability. If one sees more tritium then it implies that the neutron mode is, for some reason, suppressed. Dr. Iyengar's conjecture, based on J.R. Oppenheimer's work in 1935, is an explanation for this.

The thrust of the argument is that within solids, deuterium nuclei have very low energy and, therefore, their wave spread, as implied by quantum theory, is much larger, of the order of an angstrom (a hundredth-millionth of a cm). This is nearly a million times more than the spread in free space and. therefore, its charge distribution cannot be treated as that of a point particle. The increased wave spread reduced the strength of the barrier and increases the overlap of two deuterium nuclei. This enhances the probability for the neutron in one nucleus to tunnel and fuse with the other deuterium nucleus, while the proton remains as a 'spectator', resulting in tritium production.

Next phase

"It is the secondary fusion reactions that produce the neutrons and, therefore the neutrons we see would have an energy of 14 million electron volts", he says. The next phase of the BARC experiment is to measure these neutron energies and it is to be seen whether they predominantly have 14 MeV energy or not. Asked about detecting helium-3 or helium-4 nuclei which should also be observable as by-

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products he said that the mass spectrometers used are not sensitive enough to distinguish them from tritium and more sensitive experiments are being planned. It must, however, be pointed out here that in a recent calculation of fusion rates in solids, under some different assumptions, Drs. Steve Koonin and M. Nauenberg have estimated that they would be about 10 billion times faster than previous estimates for the rate of proton-deuterium fusion mode rather than neutron-deuterium mode which Dr. Iyengar would like to have. But even this enhancement, in the opinion of the two researchers, is not enough to produce Utah levels of energy generation.

FUEL BRIQUETTES FOR ENERGY

A unique experiment at meeting fuel needs of the rural population is the "Angaar Project" recently launched by Western Coalfields Limited in the predominantly rural township of Hinganghat in Wardha District. The project involves manufacture of small briquettes which are used as fuel. A kilo of it costs just 75 paise and it burns upto three hours.

The fuel briquettes or "Angaar" are small pellets in two weight categories of 25 gms (for households) and 60 gms (for hotels). They are made from a 40:60 ratio of inexpensive washery slurry or middlings and non-coking slack coal. The binding medium used in molasses, bentonite mud or sodium silicate. The crust devolatilisation process of manufacture in the refractory insulated and muffle heated kiln, gives the briquettes many unique qualities.

Incidentally, this process is the first of its kind here and has the possibility of adoption in other solid fuel manufacturing plants too. Among the many advantages of the fuel are its non-smoking, non-odorous and non-blackening qualities. With heat value above 4,500 k cal/kg., "Angaar" generates considerable heat with its orange-blue flames, and has a good consistency maintaining potential too. It does not crumble easily, is water-resistant and readily ignitable. It has been priced at Rs. 750 per metric tonne. As an additional service to the consumer, WCL has also arranged for the supply of specially designed 'chullahs' to use the briquettes in.

RHINOSPORIDIOSIS

A significant breakthrough has been achieved in the treatment of rhinosporidiosis (a fungal infection which causes rapid growth of unwanted tissues in the nose and nasopharynx) by scientists, at the Regional Research Laboratory (RRL), Trivandrum.

After over a year of research funded by Kerala's State committee on science, technology and environment the scientists have succceeded in isolating the causal fungus, Rhinosporidium seeberi and growing it in a culture medium. The ability to grow the fungus in a culture medium is being considered a breakthrough which may eventually lead to successful treatment of the disease by chemotherapy.

A study by the research group led by Dr. Krishnamoorthy found that all the patients had bathed in ponds at some time or the other in their life -- a very common habit in Kerala.

Besides developing the fungus in a culture medium, the researchers also tested the new fungal colonies against antifungal agents like tolnafate. They found that the fungus was resistant to many conventional methods of fungal treatment. The fungus can also survive for a long period in pond water and is resistant to radiation upto a dose of 10,000 rads.

According to Dr. Krishnamoorthy, cattle have been shown to be naturally affected by this disease. He advocates the use of laser technology for treatment of the disease, as laser rays have been successfully used in treating other mucosal lesions like papilloma and chronic granulomas.

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KRISHNA-GODAVARI BASIN

ONGC identifies 20 sites for drilling

The Oil and Natural Gas Commission (ONGC) has identified over twenty prospects for drilling in the Krishna Godavari basin, as part of its efforts to step up the pace of exploitation of hydrocarbons in the area.

While the Krishna-Godavari land is mainly a gas producing area, both oil and gas have been discovered offshore. Discoveries of gas have been made at Razole, Narsapur, Tatipaka, Pasarlapudi, Chintanpalli and Mandapetta in the East Godavari district of Andhra Pradesh. Oil has been struck at Kaikalur and Bantumilli onshore in the Krishna district. Gas has been discovered in the G-16 structure offshore.

The Commission's scheme for Godavari gas envisages development of the area in an integrated manner for supply to gas based fertiliser, power, sponge iron and agro industrial units.

Godavari Fertilisers and Nagarjuna Fertilisers are coming up with their gas based fertiliser plants at Kakinada. The Andhra Pradesh State Electricity Board has sought about 1.20 million cubic metres of gas per day for setting up a 150 MW power plant. The National Thermal Power Corporation is also contemplating putting up a higher capacity power plant which would require about 3 million cubic metres per day of gas. Certain petrochemical units have also registered their requirements with Oil and Natural Gas Commission. The ONGC has conceived a wide gas pipeline network in Andhra Pradesh. An 80 kms mainline is being planned from Tatipaka to Kakinada to connect the various gas bearing structures through branch pipelines. This is in addition to a 72 kms pipeline which has already been laid connecting Narsapur to Kovvur for supplying gas to 10 industrial units.

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US OIL COMPANY KEEN ON PRODUCTION CONTRACTS IN INDIA

The American oil company Chevron Texaco has shown interest in taking up more exploration and production contracts in India. The company's interest was conveyed to the Petroleum Secretary, Mr. H.K. Khan when Mr. John H. Silcox, President of Chevron Overseas Petroleum Inc. and Mr. L.T. Nierth Jr. Vice-president Texaco International Petroleum Company called on him at New Delhi.

Chevron Texaco is already holding four production sharing exploration contracts with Oil and Natural Gas Commission (ONGC) and drilling a well in Krishna Godavari basin. The company proposes to drill one more well in Pal offshore area soon after drilling in Krishna Godavari is complete. The progress of work in these four blocks was also reviewed during the discussions. Chevron Texaco indicated that a number of prospects in these blocks have been identified and that it was hopeful of success. It was agreed that further discussions could be held on the company's future plans in India.

ONGC TO DECIDE ON BENGAL OFFSHORE ONLY AFTER TEST WELL DRILLING

The Oil and Natural Gas Commission has an open mind on the question of drilling offshore wells in West Bengal in the Eighth Plan. It will firm up its plan in this regard only after assessing the result of its ongoing offshore activities. Nine locations, all onshore, have been identified for drilling in the coming plan period and these inlcude new areas in north Bengal. A sum of Rs. 2 crores has been earmarked for the purpose. According to informed sources the future of ONGC's offshore operation in West Bengal will depend on the success of drilling the fifth well, which is in progress in the Bay of Bengal

LPG import terminal at Mangalore planned

Four new Liquefied Petroleum Gas (LPG) import terminals will be set in the next five years to increase the import capacity to 1.2 million tonnes, the projected imports at the turn of the century. Two sites -- Kandla/Hazira and Mangalore -- have been identified on the western coast. An offer from the Maharashtra Government for developing a terminal near Raigad is also under consideration. Two sites have been proposed on the eastern coast -- Paradeep and a location near Vizag which will supplement the port's current facilities, Mr. H.K. Khan, Petroleum Secretary, said. At present there are only two LPG terminals one each at Bombay and Vizag ports.

Each terminal will cost an average Rs. 50 crores. Each oil company has been allotted one site each and have been directed to prepare feasibility studies. A terminal would take about 24 months for completion.

Simultaneously, two projects to increase the domestic production of LPG are also being implemented. Gas Authority of India Ltd., is setting up two LPG fractionating units at Bijaipur in Madhya Pradesh, work on which has begun. The first plant is expected to be commissioned in early 1990 to be followed by the second a year later.

Additional availability would come from ONGC's Lakwa plant, augmentation of LPG production at Madras and Koyali refineries and also the new refineries coming up at Mangalore and Assam, said Mr. Khan while addressing the LPG Cylinder Manufacturers Association at Bombay recently.

LPG consumption during 1988-89 has been 2.17 MT which is likely to increase to 4.52 MT in 1999-2000. In 1990-91, the total demand will be of the order of 2.3 MT against the indigenous availability of 2.04 MT which is expected to go up to 3.5 MT by 1994-95, against the domestic availability of 2.7 MT.

Mr. Khan exhorted cylinder manufacturers to extricate themselves from the problem of excess capacity by exploring the export market. To facilitate this, he promised steel at global prices and export benefits like CCS. Responding to their complaint that cylinder price has not been revised since 1983, he said the problem would be sorted out.

The Ministry of Petroleum has formulated a new policy of placement of orders from this year ranging from 20,000 to 75,000 cylinders per unit based on vendor rating and actual supplies made in 1988-89. The level of orders placed this year is 34.4 lakh cylinders, an increase of 41 per cent over the original order of 24.31 lakh cylinders during 1988-89, he said.

Approvals for three new refineries are being expedited. The three million tonne Mangalore refinery will come for PIB clearance next month and a site selection committee is finalising the location for the Assam refinery. The Karnal project is also being expedited.

The question of waiving import duties to contain the project cost at Rs. 1,600 crores has been taken up with the Finance Ministry but no decision has yet been taken. Feasibility studies on new refineries in central and western India are in progress.

Reliance Industries Ltd. has submitted a revised financial package for its proposed refinery at Jebel Ali in Dubai. Questions like mode of payment to Reliance, offtake commitment by Indian Oil Corporation etc., will be taken up only after the financial viability of the proposal is established.

All indications say that Reliance will get approval for the project in the near future. A Reliance company, Larsen and Toubro Ltd., is also in the run for partnering the proposed Central India refinery to be set up by Bharat Petroleum Corporation Ltd.

DEVELOPMENT OF MUKTA OIL FIELD: ONGC PROPOSES Rs. 1,045-CRORE INVESTMENT

The Oil and Natural Gas Commission (ONGC) has proposed an investment of Rs. 1,045 crores to develop the Mukta oil field in the western offshore area. According to the feasibility report submitted by the ONGC to the Petroleum Ministry, the peak oil production from the field is expected to be close to two million tonnes per annum and associated gas 1.4 million cubic metres per day in the Eighth Plan.

The facilities envisaged for development of the field include erection of six well platforms, completion of 50 wells, including three sub-sea wells, a process complex consisting of oil and gas process platforms with gas lift and water injection facilities and fluid flow lines. To begin with, it is proposed that oil from the field will be transported through the tankers. The gas is proposed to be routed via the Panna field to ultimately join the south Bassein-Hazira trunk gas pipeline for transportation to the Hazira gas processing terminal.

The geological reserves of the Mukta field are estimated at 74.64 million tonnes oil and oil equivalent of gas. The ONGC is relying on the Mukta field to raise the production from the western offshore area from the present level of 20 million tonnes to 30 million tonnes per annum by the end of the VIIIth Plan.

CITRIC ACID PLANT IN PUNJAB

The first citric acid plant in the country using sugar as raw material will be set up in Punjab. The Punjab State Federation of Cooperative Sugar Mills' Managing Director, Mr. Gurdev Singh, said that the Rs. 15-crore plant will have a capacity to produce 5,000 tonnes of citric acid every year. It will be set up in collaboration with a Polish firm. The plant will provide direct employment to 150 people and indirect employment to hundreds of others.

ICICI strategy to boost research activities

The Industrial Credit and Investment Corporation of India (ICICI) proposes to finance select research institutes whose innovations could be exploited on a commercial scale. Initially, fourteen such institutes would be taken up and the ICICI would provide finance on soft terms, with royalty-linked schemes to the tune of $40 million.

This was stated by Mr. N. Vaghul, Chairman and Managing Director, ICICI while delivering the key note address at a workshop on "Technology and Information Company of India Ltd. (TDICI)" organised by the Confederation of Engineering Industry (CEI), Western Region, at Bombay on August 3. Six such research institutes have already been identified, he said.

ICICI would earmark $15 million for the sponsorship of research institutes by the corporate sector, Mr. Vaghul said. Under this scheme, the Corportion would finance to the tune of 50% those companies who sponsor research institutes for product development. The balance 50% would have to be provided by the companies themselves. ICICI would also finance innovations in the service industry, Mr. Vaghul pointed out.

He opined that dependence on imported technology had made India "follower of technology" rather than "leader in technology". Commenting on the technological revolution the world was experiencing today, the ICICI chief said that research and development institutions in the country have failed to transform the basic research work into commerically viable projects.

He emphasised the need to gradually do away with the concept of "grants" which act as a deterrent to the development of viable techno-commercial projects. Speaking on the role of TDICI in the country's technology development and technology delivery system, Mr. P. Sudarshan, President, TDICI said India's first venture fund that TDICI is currently managing is worth Rs. 20 crores and has been subscribed equally by ICICI and the Unit Trust of India.

The second fund to be managed by TDICI is a Rs. 30-crore fund with a broader base of subscribers comprising ICICI, UTI the Indian banking and corporate sectors and multilateral developmental funding agencies. Commitments to this fund are being received from 250 corporate entities, agencies and the fund is expected to close its subscription list by the end of this month.

TDICI expects to generate fresh business to the tune of Rs. 35 to Rs. 40 crores in 1989-90. To meet this requirement, TDICI's third venture fund is likely to be floated towards the end of this financial year. Earlier, in his welcome address, Mr. Shekhar Datta, Deputy Chairman, CEI (Western Region) said that the technological adva made in the various spheres have re ed in enormous industrial progress social upliftment all over the w India, however, has suffered to som tent for want of "climate" to pro innovative technologies which ar tried and lacked commercial supp

PLAN TO ENCOURAGE TEN SCIENTISTS

The Indian Academy of Science selected ten young scientists fro over the country as "associates" o academy, a scheme to enco talented scientists who have sh promise in research. The recogni restricted to those below the age c has hitherto been given to 83 scien according to an academy press rel

This year's receipients are: Dr. Chakraborti of TIFR, Bombay, D Nitsure, also of TIFR Bombay, D Mehra of University of Bombay, M Athithan of DRDL (Anurag), Hy bad, Dr. B. Basu of Tata Res Development and Design Centre, J Dr. A. Deshpande of Raman Res Institute, Bangalore, Dr. G. Gangu Indian Association for the Cultiv of Science, Calcutta, Dr. U. Mait the Indian Institute of Science, Ba lore, Dr. S. Mohanty of Indian S of Mines, Dhanbad, and Dr. Rukh Chowdhury of Indian Institut Chemical Biology, Calcutta.

A new marketing organisation in Bombay needs manufacturing arrangement under loan licence for the following bulk drugs:

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CHEMICAL WEEKLY
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n to exploit low-silica dolomite deposits

country's huge low-silica dolo-eposit, found at Phalodi in Raj-, may soon be exploited to meet owing requirement of the steel . At present, the dolomite is being ted to meet the bulk requirement IL.

order to produce dolomite, the than State Mineral Development oration (RSMDC) has applied for e of 15 sq. km. area at Phalodi but overnment is yet to decide on it. d, it is learnt that the Mining rtment has granted about 150 at Phalodi to dig out marble from ea.

ormed sources say that if the e mining is encouraged at Phalodi, ght destroy the low-grade silica nite which otherwise may fetch a price. Futher, its mining will also e the country's dependence on rts thus saving foreign exchange. ntly, SAIL is meeting its bulk rement from imports from Bhutan. the Jayanti Hills area also, the Bengal Mineral Development oration is stated to be mining low-dolomite but the extent of deposit not be huge. The present produc-here is placed at around 35,000 s.

IL has placed a trial order on DC of 1,000 tonnes of low-silica nite but the supplies have not been so far. The Government has tly permitted RSMDC to mine the site quantity of dolomite.

SAIL finally agrees to meet the nite requirement from within the try, RSMDC will have to step up roduction at Phalodi. And for doing e corporation will have to depend e extent of co-operation and help the Government. It is, however, n RSMDC that the Government's ng hand is not being extended to reasons not known. Some of the active schemes" submitted by IDC to the Government for boost-he State's income have not been emented. One such scheme pertains to the full-blast exploitation of limestone deposits of Jaisalmer.

Another is to blend the low-grade rock phosphate with the imported one in order to cater to the need of the fertiliser units. RSMDC, however, has been "struggling" to find its own way and in the blending operations of low-grade rock phosphate, its performance has been beyond expectations.

The blending technology, having been established by RSMDC, can now be used in a big way at Jhamarkotra near Udaipur. There is no dearth of market. Even in this field, RSMDC has been going slow as it is not sure whether it will be able to get low-grade rock phosphate from Rajasthan State Mines and Minerals Ltd., (RSMM) a Government undertaking.

RSMM, as has been reported, is putting up a Rs. 250-crore beneficiation plant for low-grade rock phosphate at Jhamarkotra. A pilot plant has yielded excellent results.

NALCO OUTPUT IMPROVES

There has been a marked improvement in the overall progress of National Aluminium Co. Limited (NALCO) during July. A total of 67,000 tonnes of calcined alumina and 10,700 tonnes of aluminium metal were produced, the highest monthly production reached so far, says a company release.

Despite heavy rains, the bauxite mines produced 200,000 tonnes, taking the cumulative production of the current financial year to more than 640,000 tonnes. The alumina refinery produced 67,000 tonnes during the month which is equal to the rated capacity. Out of this, over 45,000 tonnes of alumina was exported.

Similarly, the company's aluminium smelter has maintained the upward trend in production with the commissioning of 261 pots by the month-end. Out of the ultimate capacity of 480 pots. During the month, it produced 10,700 tonnes of metal, the highest so far.

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Government not to meddle with aluminium prices

The government has refused to direct primary producers of aluminium to reduce the prices to international level. It is of the view that since the aluminium prices have been decontrolled from March 1st last, the government cannot interfere in this matter. The government has been receiving representations from consumers for directing the primary producers to reduce their prices in view of the lowering of the international prices of aluminium.

The consumers have been arguing that the producers resorted to increasing their prices whenever the international prices went up. In fact, immediately after the aluminium prices were decontrolled, they went up by Rs. 2,000 to 3,000 a tonne. Now that the international prices of the metal have come down considerably, Indian producers should also follow suit.

High-grade aluminium (99.7%) was quoted at the London Metal exchange at $1817-1820 a tonne on June 29, 1989, compared with the month-ago price of $1975 to $1980. The year-ago price was in the range of $2610 to $2630. Cash aluminium was traded at June-end at $1860 to 1862, 31% lower than the year-ago level of $2690 to 2710 a tonne. The world output figures have shown a rise during the first five months of 1989. The latest available figures have been widely predicted to show a continuing rise in production. The trend is considered to be inline with the earlier forecast of surplus aluminium in 1989.

According to an estimate, the total supply during the year is expected to go up by 2.1 per cent to 14.45 million tonnes, and consumption by only 1.5 per cent to 14.21 million tonnes. The surplus aluminium will also be in the face of an expected slackening of the demand. At home, the price of aluminium ingot has remained steady at around Rs. 43.50 a kg. Aluminium production increased from a mere 5,000 tonnes 1950 to about 2,76,000 tonnes 1984-85. In 1985-86, production w 2,65,000 tonnes whereas in 1986-87 was 2,57,000 tonnes.

Consumption of aluminium in In increased from 15,000 tonnes annum in 1950 to 3,20,000 tonnes annum at present, attaining a compo growth rate of more than eight per c per annum. The present installed cap ity for aluminium production in country is 3,62,000 tonnes and, w NALCO becoming operational, would go up to 5,80,000 tonnes.

It is estimated by the government during the current year, the total p duction by the primary metal proc ers would be around 4,00,000 ton against an estimated total demand about 3,85,000 tonnes.

BALCO SIGNS MoU WITH MM

The State-owned Bharat Alumin Company Limited (BALCO) signed a memorandum of understand (MoU) with the Minerals and M Trading Corporation (MMTC) to launch its products in the internati market.

BALCO, a leading primary alu ium producer, has drawn up a m export plan for the current year. Ag its total export of a wide variety of minium products at Rs. 1.1 crores year, the company has set an ex target of Rs. 6 crores for 1989-9 release said.

The MoU was concluded at Delhi on August 3, in the presen Mr. P.S. Rao, Chairman and Mana Director of BALCO and Mr. I.P. arika, Chairman and Managing D tor of MMTC. The signatories t MoU are Mr. P.S. Gupta, Exec Director (Commercial) BALCO Mr. P.K. Shastri, Group General ager of MMTC.

In its maiden entry on the national market last year, BALCO ceeded in exporting about 300 nes of semifabs valued at Rs. crores.

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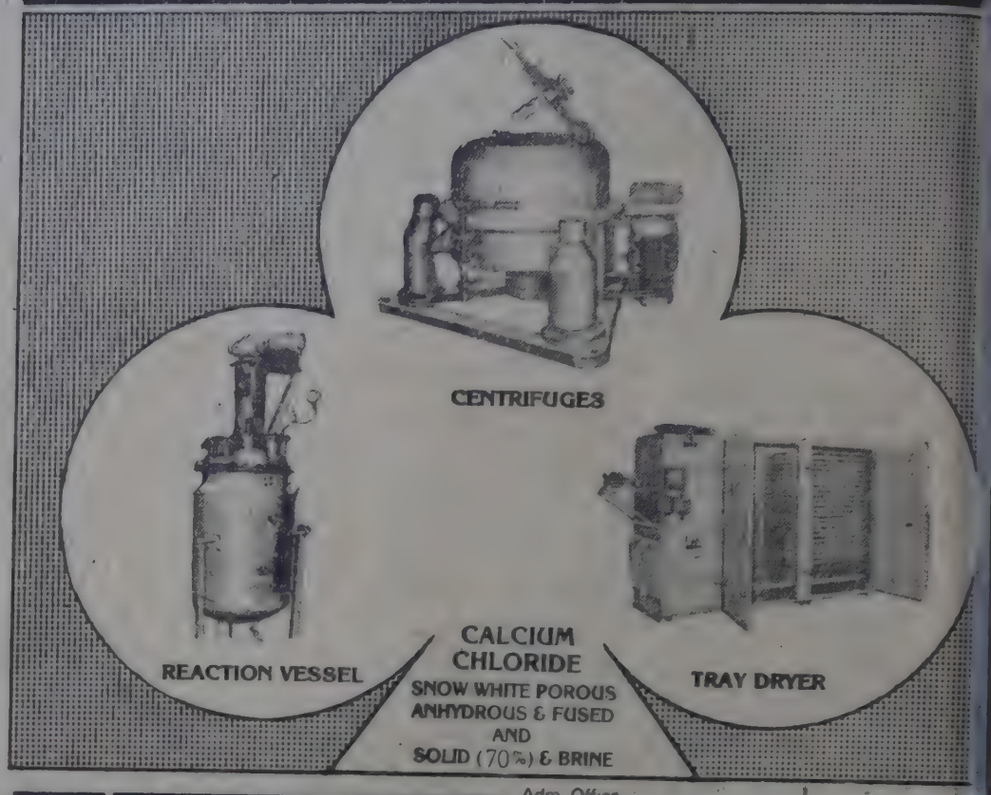

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Highlights in Chemical Technology (Part 2)

NE POULENC BECOMES RLD'S LARGEST PRODUCER SODAMIDE

hone Poulenc has recently unveiled w Sodamide production plant at its chemical site in Norwich (UK). The t took around sixteen months to l at a cost of £ 2.5 million. One ter of the cost of development went afety features such as microproces- alarm systems for detection of nonia, oxygen deficiency, smoke fire. The new facility gives a pro- ion capacity of 1000 tonnes per m on the one acre site, making ne Poulenc the largest Sodamide ucer in the world, selling in Europe, n, North and South America, Scan- via, India and the Eastern Block. A ain amount of built-in flexibility ns that expansion will be possible.

he main use of sodamide is as an rmediate in the manufacture of rmaceuticals as well as some tech- l products such as dyestuffs. Rhone lenc expects increased demand for amide as its customers develop new s. (*Chem In Brit.*, 5/1989, p. 455).

TALYTIC CONVERSION OF DROCARBONS TO INDU- RIAL ALCOHOLS IN A SINGLE EP ON THE HORIZON

Hydrocarbons can be converted to ustrial alcohols in a single step with alysts developed at the University of lifornia (San Deigo). The commer- lly available catalysts cannot do this ll, reports Prof. Teddy Traylor, ause they break down the alcohol l it is difficult to stop the process at alcohol production step. Also, con- ntional catalysts work with specific drocarbons, whereas the new cata- ts can handle various ones according Prof. Traylor who described his research breakthrough at the recent ACS meeting in Dallas, Texas last April. Traylor's process uses perhalogenated iron porphyrin catalysts, which (unlike simple porphyrins) are very tough. A catalyst and a peracid (e.g. an acyl derivative of hydrogen peroxide) are reacted to form a highly reactive intermediate that hydroxylates the hydrocarbon at ambient temperature and pressure.

Traylor has worked with a number of hydrocarbons, including octane, cumene, toluene, cyclohexane, methylcyclohexane and bicycloheptane. At 10-20% conversion rates, the yield is 80-90% and purity about 95%; at 50% conversion the yield is less, but the only impurity is ketone, which Traylor says would be easy to remove. Traylor has been contacted by several chemical companies for commercializing the process. (*Chem Eng.*,5/1989, p. 17).

A NEW PROCESS IN PRODUCING SUPERIOR POLYPROPYLENE (PP) UNVEILED FOR LICENSING

A new process for making polypropylene (PP) with better properties has been recently unveiled by Himont Inc. (Wilmington, USA). The new process allows PP processors to improve throughput rates (by 5-15% for extrusion, 5-87% for moulding), reduce energy consumption by 10% and obtain better end-product properties -- is available for licence from the above company. The new technology can also produce new grades of polypropylene.

Himont has developed proprietary hardware and additive packages (to complement its sphereool process) to stabilise PP spheres immediately after the reaction. Thus, the particles are not subject to the high temperature of the extrusion and pelletizing step usually used to stabilise the PP after it exits the reactor. Therefore, the final product has less crystallinity than PP made with existing technologies.

The more crystallinity a polymer has, the more energy is required to melt it during processing. The PP made by the new route is trade-named Valtec and will be sold by Himont at a 5% price premium over the other PP grades. (*Chem Eng.*, 5/1989, p. 19)

THE WORLD'S FIRST PRODUCTION SCALE SUPERCONDUCTING — THIN FILM MACHINE ON THE HORIZON IN 1989

A production scale superconductive thin film machine — the world's first — will be developed at Du Pont Co's Superconductivity Concept Centre in Wilmington, Delaware. The unit, System 5000, is being built by Emcore Corp. (Somerset, NJ) a supplier of technology and equipment for chemical vapour deposition (CVD), chemical beam epitaxy (CBE) and other thin film processes for microelectronics and advanced material fabrication.

Production scale means that the machine will be guaranteed to produce thin films of given purity levels and to work on multiple 2,3 or 4-in. wafers at a time. Among the highlights of the Emcore CVD machine is a rapidly spinning (up to 2000 rpm) platter that holds the silicon wafers from which integrated circuits are made. The spinning allows for production of monomolecular layers having compositions and structures within 99% of specific actions.

Tests have confirmed the onset of superconductivity at temperatures of 60-95 K, in yttrium-barium-copper mixtures made by the System 5000. (*Chem Eng.*, 5/1989, pp. 19-21).

FRANTIC SEARCH FOR SUBSTITUES TO REPLACE CFCs

Thirteen companies from around the world have announced a joint scheme for finding substitute chemicals for some CFCs which they all manufacture and are said to be responsible for damaging the world's ozione layer. CFCs (chlorofluorocarbons) have become invaluable in such fields as refrigeration, air-conditioning, sterilization and food packaging. Among the qualities which have made them so useful is stability, the very quality which is allowing them to endanger the ozone layer which provides protection from damaging ultra-violet rays. As a consequence consumption of the halogenated CFCs is to be frozen this year with a view to reducing it by half over the next decade.

To speed the development of replacement, the companies who include ISC Chemicals, and ICI and Du Pont in USA are cooperating to avoid time-wasting duplication of testing and experimentation. The most promising replacements for CFCs at present appear to be the compounds HCFC-123 and HFC-134a. It is around their development that the joint-testing programme is based.

INSTRUCTIONAL VIDEO TAPES ON CHEMICAL PROCESS SAFETY MAKES A DEBUT IN USA

Instructional videotapes on chemical process safety will now be available from the American Institute of Chemical Engineers' Continuing Education Dept. (New York City). Developed by Wayne State University (Detroit) and BASF Corp. (Wyandotte, Mich.) the tape package consists of 3.5 hours of material in 7 VHS cassettes, plus a 92-page study guide and additional supporting materials.

Topics covered include laboratory safety, AIChe's Design Institute for Emergency Relief Systems (DIERS); personal protective equipment; management systems for safety; inspections in lab and process areas; process-area safety procedures; experiments for teaching safety principles; and informal and formal safety reviews. Profits from the sale of the tapes will be used to support research and instruction in chemical process safety. (*Chem Eng.*, 5/1989, p. 21).

NEW POLYMER-BASED ADSOR-1BENTS REMOVE OBNOXIOUS ODOURS FROM THE ENVIRONMENT

Researchers at the federally-run Japan Atomic Energy Research Institute (JAERI), Tokyo, have developed two polymer based adsorbents by employing the Institute's radiation graft polymerisation technology. The new adsorbents remove obnoxious odours, such as ammonia and hydrogen sulphide from the air.

The novel production process includes irradiation of the nonwoven polypropylene fabrics to form radicals, which then react with vapour-phase monomer. Ebare Corporation, a Tokyo-based pump maker interested in commercial production of filters for air purification in both industrial and home uses, helped JAERI with development work. (*Nonwovens Ind.*, 11/1988, p. 12).

A RECYCLING MODULE SYSTEM FOR ELECTROPLATING INDUSTRY WASTE MAKES DEBUT IN USA

Compliance Recycling Industries Inc. (USA) has developed a novel module system for recycling water from heavy metal wastewater from electroplating industry. The company sees a great potential for its module system because of the threat of contingent liability for producers of toxic heavy metal waste.

Electroplaters in the USA are banned from flushing wastewater down d and new laws prohibit disposal of h metal sludge in landfills unless s in concrete. Further landfills ch have doubled over the past year, an number of available landfills dropped across the country. The C pany reports its unique system for ing electroplating waste relies on sets of large modules containing a ciality plastic head resin that use ion-exchange principle found in h water softeners.

Electroplate waste water through the resin emerges as lea ionised water and is recycled back the electroplating process. The C pany process turns waste particles metal powder sold to smelting co nies as casting material for jewe The firm's system sells roughl $ 35,000 and can be leased for ap imately $ 850 per month. Monthly recycling fees range from $ 8 $ 4,000, depending on usage the can last upto seven years.

The EPA in USA is schedul select best developed available tec ogies for recycling all hazardous w The firm will petition in the near f to the EPA to recognise its resin exchange system as the best to recycling electroplating waste. Th was only recently founded in 19 has recently opened a new facil Leviltown, Pa. to handle electrop waste from 1000 electroplaters o Eastern Seaboard. It operates a pl Denver and plans to open a third ity in Chicago and later on to other areas of USA. (*CMR*, 5/15/ 22).

PROTEK PROCESS HERALD ON-SITE CHEMICAL FIXAT OF HAZARDOUS WASTES

Protek Environmental Inc. (Hu ton Beach, Calif.) reports it has su fully developed a new technolog service for on-site chemical fixat hazardous wastes. Called Prof

ropreitory chemical fixation and stabilisation process treates inorganic and heavy metal contaminated soils and sludges. Contaminants are treated in a controlled manner and rendered non-hazardous according to environmental agency regulations. The result is a solid polymer matrix in which the soluble metal contaminants are converted to a stable insoluble metal silicate. Key to the development, the company reports, is a chemical fixation technology that prevents long term leaching. This is a great breakthrough for any one cleaning up a contaminated site, because it eliminates the worry of toxic contaminants re-entering the environment over time.

The chemistry of this proprietory process utilises an abundance of highly amorphous silicates to capture and lock up contaminants from soils and sludges. These contaminants are locked into a highly stable cementitious matrix that retains the waste and resists any chemical migrations. (*CMR*, 5/1/89, p. 24).

THE WORLDWIDE SPECTRUM ON SYNTHETIC DYES

Most synthetic dyes are organic compounds and were not developed until the 19th century.Until then the only dyes available were those based on natural materials and refined from animal or vegetable matter. Nature has a vast variety of colours. The achievement of the synthetic dyestuff industry has not been just to duplicate these natural hues synthetically, but to create colours never seen in nature.

The first person to stumble on a synthetic dye was William Perkin in 1856. He was trying to synthesise the drug quinine. Instead he discovered a method of synthesising a highly coloured compound which he named mauve. From this discovery grew the enormous synthetic dye industry of the world.

In the last two decades the synthetic dye industry has grown rapidly in India, but as yet India has not emerged as a leading dye producer. The major synthetic dye producing countries are listed in Table-1 below:

Table-1: Major Synthetic Dyes Producers (1985)

COUNTRY	PRODUCTION IN '0000 TONNES IN 1985
W. Germany	1,34,000
USA	1,18,000
USSR	73,000
Japan	55,000
UK	43,000
France	40,000
Poland	18,000
Romania	16,000
Czechoslavakia	15,000
Italy	15,000
East Germany	12,000
Turkey	9,000
Republic of Korea	8,000

(*New Sc., 5/20/89*).

CHEMICAL FIRMS TAKE THE POISON OUT OF CFC-113

Du Pont the world's biggest chemical giant has patented two replacements for one of the chlorofluorocarbon gases that are black-listed on the Montreal Protocol. The replacements are for CFC-113, whose main use is for cleaning electronic circuits. At present, the gas accounts for about 13% of all CFCs produced.

One replacement is a blend of methanol and other CFCs which, according to the company, have no harmful effects on the stratospheric ozone layer which protects life on Earth from harmful solar radiations. The other replacement contains no CFCs. The first of Du Pont's replacements for CFC-113 contains two chemicals called HCFC-141b and HCFC-123. Because these substances are less stable chemically than the CFCs they break down before they reach the stratosphere ozone layer. Du Pont estimates that the blend is only one-tenth as destructive as CFC-113, which now accounts for one-fifth of the market for CFCs.

The second replacement unveiled by the Company is a biodegradable mixture of solvents and chemicals with special properties that affect the boundaries between fluids. Some of the agents are soluble in water, some are not. Du Pont reports that this 'semi-aqueous' blend is non-flammable provided it is used in 'properly designed equipment'. Some candidates replacements for CFC 113 include flammable solvents. Du Pont says that it has 'limited quantities' of both mixtures for testing and hopes to market the same aqueous blend by the end of 1989. The other replacement may take a few years to become available commercially. (*New Sc.*, 3/18,89, p. 31).

WB-400 A NEW SYNTHETIC FABRIC MAKES A DEBUT IN SWITZERLAND

When it comes to winter sports and the need for a combination of comfort, durability and thermal insulation the Swiss take it very seriously. Schollar Textil in Derendingen (Switzerland) has developed WB-400 a technically advanced highly engineered purpose fabric.

A new stretch construction incorporates a highly elastic membrane that avoids problems of inadequate elasticity associated with some constructions. WB-400 is elastic in two directions and does not delaminate with repeated stretching.

One construction has 40 stretch in both warp and filling directions. It has an outer layer of nylon/lycra (Du Pont) elastomeric and an inner layer of terry. An intervening membrane allows moisture release without allowing wind and dampness react to water. (*Textile World*, 9/1989, p. 47).

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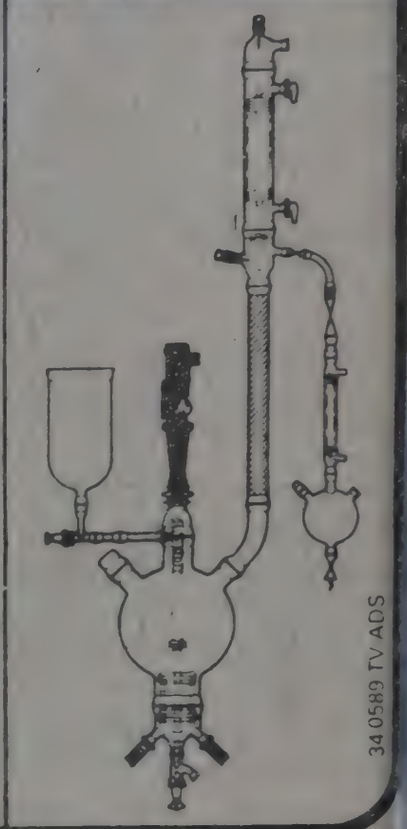

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MATERIALS MANAGEMENT
Part VII - Inventory and its Control

N.R. PAI

NVENTORY AND ITS RAMIFICATIONS

Inventory represents material which is held as stocks by n organisation for its future use or sales. It is a resource that kept idle as a buffer stock to be used subsequently. This le stock acts as the potential source of:

Raw material required for production activity;
) Finished products stocked prior to sales. Over and above these two categories the term inventory also includes;
i) Material in process or in-process material. These three categories generally go under the common head: Specific inventory.

However, the term inventory is often further extended to cover:

') Idle resources lying in the form of purchased machine spares, machine accessories etc.;
.) Different tools and equipments to be used.
i) Materials purchased for future office purposes eg. furniture, stationery etc.

When applied in limited sense inventory includes materials and goods in physical condition. However, the term is ometimes extended to cover:

ii) Stockpiling of managerial and high level technical personnel and know-how bought for future use. It keeps useful persons and information handy.

Note that all these mean investment which is to be cashed ater as and when it is possible to cash. It keeps the funds locked which are therefore not immediately available for ny other useful organisational activity. Hence any investnent which has to be used/cashed later and which blocks the mmediate availability of organisational funds, is nowadays ncluded under the head "inventory," when taken in a broad ense.

. Raw Material Inventory

It is a safeguard against unforeseen circumstances which nay lead to block the production activity because of the learth of raw materials. e.g. (a) Transport difficulties; (b) Non-availability of raw material in the market; (c) Import ban if raw material is an imported one and so on. Hence certain stocks of raw material in the stores is absolutely necessary to ensure smooth flow of production.

On the other hand excessive inventory keeps the funds blocked unnecessarily and at times becomes the cause of failure of a running business, eg. when cheaper raw material becomes usable because of drastic change in technology. Hence inventory of raw materials has to be maintained at the right level which is accomplished with the help of inventory control models which will be discussed subsequently.

2. In-process material

Some in-process material is bound to be there when the production is underway. It is in fact unavoidable. Some in-process material exists in the form of semifinished goods while others remain under actual processing. Occasionally this in-process material has to be checked to ascertain material balance. Material balance is the calculated, predetermined output of finished goods against certain definite input of raw materials.

3. Finished goods inventory

Every organisation has to maintain certain stocks of finished goods it has manufactured. They are needed to meet the sudden unforeseen rise in sales. Again, if there is a difficulty in manufacturing due to raw material shortage, machinery failure, service failure, strikes etc., then it is on these stocks that an organisation can fall back upon to keep up the sales and thereby the customer relations, at least for some time to come.

Very often there is stock-piling of finished goods in case of products which have seasonal market. Such goods are stock-piled in off-season. It serves two purposes. In the first place it keeps the labour employed during the slack season, and secondly, it keeps the finished goods handy for sale in the peak season that follows. This class of inventory is often referred to as anticipatory inventory.

4. Other inventories

These have been mentioned earlier in this communication. They are required to ensure smooth and efficient functioning of all the organisational activities. To this class "transit inventory" can be added. Transit inventory refers to goods under transportation and includes finished products which are under transit from point of their manufacture to the spot where they are stored or used.

INVENTORY AS MODERN NECESSITY

Inventory can be looked upon as having arisen out of two modern considerations viz. the labour laws and the time consciousness.

1. Labour laws

To-day manufacturing plants cannot be kept closed intermittantly as and when the raw material stocks run out. A different situation existed in olden days. In those days workers on civil constructions for example could be given lay off without compensation, when there was stock out position or lack of working appliances. To-day such a situation will not be tolerated by the labour laws prevalent in industry. It is against modern laws, it is against modern trends. Therefore some inventory has to be kept to avoid stock out-position in modern times.

2. Time consciousness

Before scientific management was introduced by F.W. Taylor, the following four points were lacking in the industrial world. They are: time consciousness, quality consciousness, task discipline, and method discipline. Here we are concerned with the first point only. In olden days there was no time consciousness. To illustrate by example, in those days traders used to supply spinners and weavers with cotton, the raw material. These technicians of those days used to work in their own ways as regards time, to produce and supply finished goods to the traders. There was no fixed time assigned for their working. To-day the situation is totally different. Production is against time; you have to supply your customers with the finished goods in time. Otherwise you run the risk of loosing your future business with them. Today, you cannot keep your machines idle. They should work in accordance with the production plan laid down and confirmed after referring to the machinery utilization chart. Otherwise, you run the danger of loosing machine hours and along with them, man hours. This time consciousness reflects even in the modern vehicles sold. They carry spare wheels at extra cost to avoid delay due to any unforeseen contigency. It means that to-day we have to pay extra for spare wheel or for stocks of raw materials or of finished goods to avoid delays in our dealings, which is vital. Inventory is thus a necessity to avoid delays in to-days world.

INVENTORY LEVELS AND WAREHOUSE FACILITIES

Inventory levels of different frozen assets are mutually dependent. Thus if an organisation spends more in stockpiling raw materials then its capacity to hold finished goods stocks naturally comes down. Hence, correct balance has to be struck between the levels of different inventories: Further, fast moving inventories bring down the requirements of ware house facilities. Thereby space which is costly today is used economically. It therefore helps in augmenting profits by cost reduction.

INVENTORY CONTROL

Need for controlling inventory

On one hand inventory is a necessity, on the other hand it blocks the organisations funds. Hence there has to be a proper balance. This balance is established by way of control over the funds which are needed to be spent and locked up in inventory.

When taken on a nation-wide scale the total inventory holdings in all the Indian industries taken together run into thousands of crores of rupees. Generally 25% of the material cost is taken as an inventory carrying cost per annum. Carrying cost is the cost of maintaining stocks. The only job this money is doing is to hold the stocks. That is all it does and nothing more. To hold the inventory is therefore very costly. It is vital for the very existence of any organisation to control the stocks of materials and thereby bring down to a minimum necessary level the money tied up with them.

Inventory turn over rate

Thus higher the stocks, more the expenditure associated with them. It therefore influences directly the organisation profits. To put it in more accurate terms, it is the inventory turnover rate that is intimately connected with profits. Inventory turn over rate is defined as the number of times the total annual inventory of a firm gets used up and has therefore to be replenished every year. Thus if an organisation maintains 4 months stock, then inventory turn over rate is 3, 2 months stock, then this figure is 6. Higher the rate, more the profits, because at any given time less money gets blocked in stocks. This can be made more clear with the following concrete example.

We have here three organisations with the same annual turn over, the same raw material cost and the same profit before deducting carrying cost. They differ only in the inventory turn over rate and as a consequence, net profit in the three cases work out to different figures as shown in the Table I. It can be noted from the table that profit is the highest with the firm Z where inventory turnover rate is maximum and is the least in case of firm X where this turn over rate is minimum.

Mathematical models in inventory control system

There are two important mathematical models which are employed as management techniques in the invntory con

Table - I

		Organisations		
		X	Y	Z
1.	Annual turnover in Rs.	5 Crores	5 Crores	5 Crores
2.	Annual material cost in Rs.	2.5 Crores	2.5 Crores	2.5 Crores
3.	Profit before considering carrying cost in Rs.	75 Lakhs	75 Lakhs	75 Lakhs
4.	How many months stock held at a time?	4 months	2 months	1 month
5.	Inventory turn over rate (Divide 12 months by the respective figure under row (4)	3	6	12
6.	Money blocked in inventories in Rs. (Divide figures under row (2) by the respective figures under row (5)	83.3 Lakhs	41.6 Lakhs (Figures rounded off)	20.8 Lakhs
7.	Cost of carrying inventory in Rs. (Taken as 25% per annum. Hence 25% of figures under row (6))	20.825 Lakhs	10.4 Lakhs (Figures rounded off)	5.2 Lakhs
8.	Net profit in Rs. (Subtract figures under row (7) from figures in the corresponding column under row (3))	54.175 Lakhs	64.6 Lakhs (Figures rounded off)	69.8 Lakhs

system. These are: 1. EOQ (Economic Order Quantity) model and 2. EPQ (Economic Production Quantity) model.

Let us consider EOQ first.

Economic Order Quantity model

Every manufacturer has to produce and deliver his finished products in right quantity, of right quality and in the time scheduled. Hence certain stocks of raw material are needed to avoid "stock out" position. Again we have already seen that too much stock piling is an unnecessary drain on financial resources. Excessive inventories are harmful and they do contribute to business failure. Hence the main object in controlling inventory, is to strike a correct balance between the cost of holding an item and the cost of running out of it. EOQ model helps in achieving this balance.

In fact, EOQ is an important tool in the hands of materials manager to achieve this balance. The model dates back as early as 1915. With the help of EOQ, the materials manager can ascertain quantity of raw material to be ordered at a time, which would result in lowering the cost on materials to a bare minimum.

EOQ considers two basic costs:—

i) Ordering cost and
ii) Carrying cost.

1. Ordering Cost

It is the cost a firm incurrs every time it places an order. It is generally shown as Rupee figure per order and includes:—

a) Cost of receiving, inspecting and of placing in stores the goods ordered.
b) Salaries of administrative and clerical staff of purchase section.
c) Rentals and maintenance expenses (fans, lights, air conditioning etc.) of purchase section.
d) Cost of time spent by accounts department personnel for purchase work.
e) Expenditure incurred by way of stationery usage.
f) Expenditure due to telegrams, cable grams, telephones and telex incurred for purchase departments work.
g) Cost of the time spent by the officers from other sections who are on tender committees.
h) In case buyer's representatives visit vendors premises for inspecting materials prior to their purchase, then their travelling expenses and their incidental expenses during travel.

All these expenditures are summed up per annum and their average is worked out which is then taken as the ordering cost ie. cost of placing one order for EOQ calculation.

$$\text{Thus ordering cost} = \frac{\text{Costs due to total annual orders}}{\text{Number of orders placed annually}}$$

2. Carrying cost

It is the cost incurred by an organisation as a consequence of holding or maintaining inventories or stocks and it includes:

a) Salaries of inventory/stores section including pay roll cost of security personnel meant for protecting stores.
b) Rentals and maintenance charges of inventory/stores section.
c) Interest on the funds blocked in inventories.
d) Charges of insuring stored goods.
e) Record keeping charges by way of stationary used.
f) Loss due to pilferage.
g) Obsolescence — It is the cost the firm has to bear in case raw material/inventory becomes outdated due to drastic change in technology.

Carrying cost is then shown as a percentage of the average inventory. It is generally indicated in terms of annual figure.

3. Total Cost

Since total cost is made up of these two (ordering and carrying) costs, it is evident that the materials manager should minimise both of them. However, they are related to each other in an opposing manner i.e. if you try to pull down ordering cost, the carrying cost swells up and vice versa. Ordering cost is devided by the number of orders placed to get the required quantity of goods into inventory. Now for the fixed annual demand, as the order size increases, the number of orders per year comes down. This reflects in the decline of ordering cost. Now, as the number of orders decreases, the amount of material placed as an inventory per every order boosts up. This steps up carrying cost.

Above point can be better understood, when put in mathematical terms.

Let, Or = number of orders placed per year.
A = Total annual demand
and Q = Quantity per order or size of each order.

Then we have,
Or = A/Q — (i)

Now, if C = Cost of placing each order. Then annual ordering cost

= Or x C = A/Q x C = AC/Q — (ii)

Referring to equation (i) as Q steps up, Or declines and since Or decreases Or x C will also come down. It amounts to saying that as the quantity per order (Q) increases, number of orders per year and hence the total yearly ordering cost (Or x C) comes down.

Now, if P = price of each unit or each item.
E = Managements understanding of annual carrying co

expressed as percentage of P then P X E = Cost of carryin or holding one unit.

And total carrying cost is given by Q/2 x PE, where Q/2 average inventory.

It is worth noting that as Q increases, Q/2 is also increase Therefore Q/2 X PE also goes up. In other words, carryi cost steps up with increase in order size. It is also interesti to note that for ordering cost formula, Q appears in the den minator while in carrying cost formula 'Q' comes in nume ator. No wonder then that the two costs are related to ea other in an opposing manner.

Why Q/2 is taken as average inventory?

In the above discussion Q/2 is taken as an average inv tory. The reason for this will be clear from the follow example.

Consider a company placing an order for 2000 units out of which it utilizes 400 units every week. Then aver inventory of the 1st week is 1800 units (start of the w inventory was 2000, end of the week it was 1600. Hence a age inventory = $\frac{2000 + 1600}{2}$ = 1800)

It is also called mid-week inventory. Since 1800 units be in stock on Wednesday evening of the first week, tak the week to be of 6 days working starting from Monda Saturday, average (mid-week) inventories for the rest of 4 weeks can be calculated. These are shown in Table II h under.

Table II

No. of Week	Mid-week inven
1	1800
2	1400
3	1000
4	600
5	200
Total	5000

The average of this figure 5000 is = 5000/5 = 1000 The same figure can be arrived at just by halving Q.

Since Q = 2000, Q/2 = 1000.

This example clarifies well why average inventory is as Q/2 where Q is the quantity per order. However, th

he assumption made here and that is daily consumption is ken as constant.

It is worth noting at this stage that every mathematical odel used in management techniques has three common fea- ires. These are: assumptions, logic, and limitations. Accor- ingly we will consider first assumptions that are made for eveloping EOQ model.

ssumptions for developing EOQ model:

1. Annual demand for the goods is assumed to be known vith certainty. EOQ model is therefore developed under the onditions of certainty. It is therefore a deterministic model. Model is said to be deterministic when variables in it have ixed value/s.

2. The rate of depletion of inventory is assumed to be con- tant. Note that average inventory is taken as Q/2. But this olds good only under the conditions of its constant usage nd hence of its constant depletion.

3. The lead time is assumed to be known with certainty. ead time is the time taken to get the goods in the inventory. n fact, there are two lead times: (a) managements lead time nd (b) suppliers lead time. (a) Managements lead time is he time lapsed from managements decision to order goods o the actual time of placing the order for them. (b) Suppliers lead time is the time consumed from placement of an order o the time of receiving the goods by the purchaser.

With these three assumptions, simplified form of EOQ model can be developed which can be modified later to suit the specific requirements. However, it should be borne in mind that the above assumptions are not totally realistic. Nev- ertheless, they do permit us to learn in an uncomplicated way the development of EOQ. Further sophistication of the sim- plified model can be had only if this basic form is clearly followed.

Before we proceed to develop EOQ model, let us get our- selves acquainted with the shortcomings of trial and error method.

Drawbacks of trial and error method:

For clear understanding, the following example will be useful. Consider an organisation with the following data:—

1) Fixed Annual demand (A) = 3000 items
2) Cost per order (C) = Rs.60/-
3) Price of each item (P) = Rs. 20/-
4) Carrying cost (expressed as percentage of P) (E) = 20%.

Then ordering cost, carrying cost and hence the total cost can be ascertained for different sizes of the order. They are shown in Table III below:

Table - III

Size of each order	Number of orders	Ordering cost (Rs.)	Carrying cost (Rs.)	Total cost (Rs.)
Q	Or=A/Q	α=Or X C	ß=Q/2xPE	α+ ß
3000	1	60	6000	6060
1500	2	120	3000	3120
750	4	240	1500	1740
500	6	360	1000	1360
200	15	900	400	1300
150	20	1200	300	1500
100	30	1800	200	2000
50	60	3600	100	3700

Here there are two points to be noted, as the order size decreases:

i) Carrying cost declines and ordering cost boosts up and
ii) Total cost first decreases till it reaches 1300 and then steps up again.

From the above table it is clear that the least total cost is arrived at when order quantity (Q) reaches 200. But one does not know whether it is possible to have still further reduc- tion in total cost. Again, this is a time consuming and ted- ious procedure. Therefore to arrive quickly at the correct and accurate decision, EOQ model is developed.

(EOQ model will be discussed in the following commun- ication).

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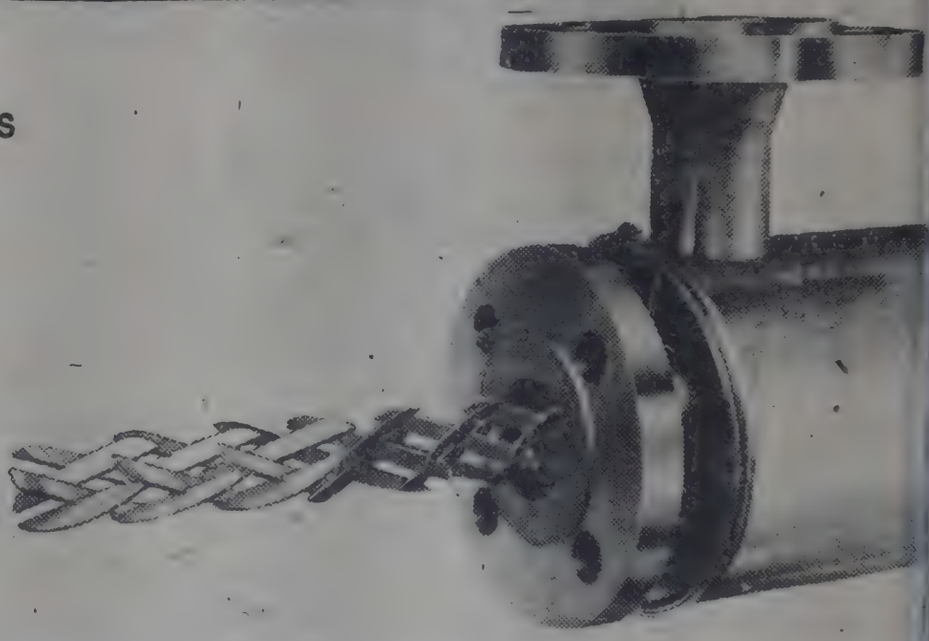

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POTLIGHT ON INORGANIC CHEMICALS

Hydrofluoric Acid

B.A.V.K. SHARMA*

troduction

Hydrofluoric acid was first prepared by Scheele in 1771, ough the property of etching glass with the acid fumes from uorspar was recognised long before. The production of ydrofluoric acid commercially from fluorspar was started om the year 1930.

he fluorine containing minerals are:
1. Fluorspar,
2. Cryolite and
3. Fluorapatite.

Fluorspar is a translucent to transparent mineral, varying colour from white, blue, green to purple. Fluorspar is invaably associated with other minerals such as quartzite, calite, dolomite, barite and galena. Benefication has to be done upgrade the fluorspar to acid grade which analyses to CaF_2 98%, SiO_2 1%, 0.03% sulphur and less than 0.1% oisture.

Fluorspar is found in Mexico, Western Europe, Eastern loc, Far East, Africa, South America, USA and Canada. The ccurence of fluorspar in India is negligible. Flux grade fluspar is available from Khairagarh and Nandgaon of Madhya radesh. Fluorspar is also found in Dungarpur district of outh Rajasthan.

The most important and economically valuable deposits ccur in the Amba Dongar complex of Gujarat. The only ommercial deposit of cryolite (sodium aluminium fluoride) s in Greenland, but very little is mined. Fluorapatite conains 3 to 4% of fluorine and the phosphatic fertiliser industry which uses the mineral, produces hydrofluosilicic acid s a by product.

roperties

Anhydrous hydrofluoric acid is a colourless, fuming, corosive liquid. The acid on contact with skin causes extremely erious burns. Vapours are very irritating to the eyes and nucous membranes. Mol. Wt. 20.01, specific gravity 0.988 (13.6°C), m.p. - 83°C, b.p. 19.4°C. Threshold limit value 3 ppm; dissolves silica and glass. Soluble in water.

Manufacture

Hydrofluoric acid is manufactured by heating together sulphuric acid and fluorspar.

$$CaF_2 + H_2SO_4 \longrightarrow CaSO_4 + 2HF$$

The impurities in fluorspar undergo the following chemical reactions:

$$SiO_2 + 4HF \longrightarrow SiF_4 + 2H_2O$$
$$SiF_4 + 2HF \longrightarrow H_2SiF_6$$
$$CaCO_3 + H_2SO_4 \longrightarrow CaSO_4 + H_2O + CO_2$$

The undesirable impurity silica in fluorspar results in the loss of hydrofluoric acid. The loss is two parts to every one part of silica present. The impurity calcium carbonate consumes extra sulphuric acid than what is actually required for the reaction by a quantity equal to its quantity in the fluorspar. Further, the impurities like sulphur in the fluorspar though initially converted into sulphur dioxide and hydrogen sulphide ultimately converts into sulphur which creates problems by getting deposited in the gas handling equipment.

Hence it is very important that the fluorspar used be as low in impurities as possible. The requirements of raw materials and utilities per ton of anhydrous hydrofluoric acid is as follows:

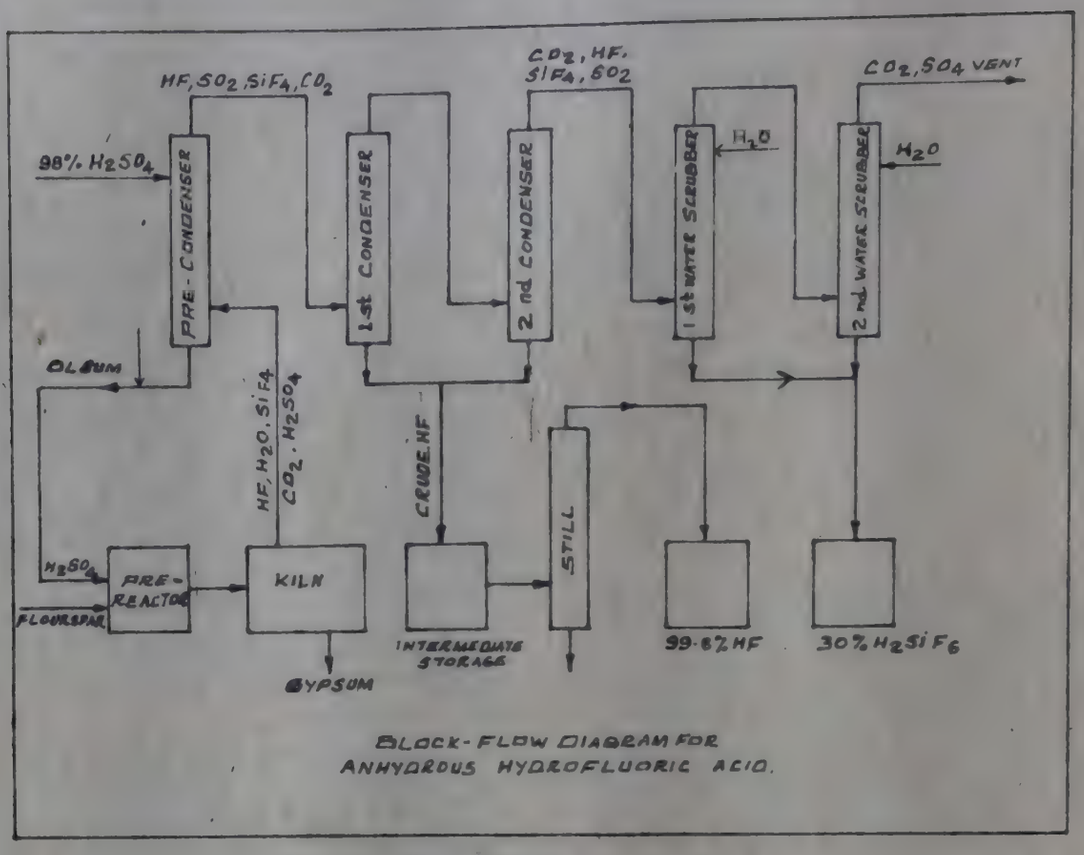
1. Flurospar (98%)	2.25 MT
2. Sulphuric acid	2.85 MT
3. Fuel	2.3×10^6 Kcal
4. Refrigeration	3.6×10^5 Kcal

Fluorspar is pulverised into a fine powder and fed continuously with sulphuric acid into a pre-reactor. The reactants in the paste form pass to the heated rotary-kiln-main-reactor which is about 4m in diameter and 30m in length & rotates at 1 rpm. Gases evolved in the kiln leave through the feed end and into the disengaging section while gypsum solids are disengaged at the downstream end.

The hot reactor gases enter the precondenser column where they are cooled and scrubbed free of entrained solids and sulphuric acid mist using incoming sulphuric acid. This acid after the addition of oleum to combine with any water then becomes the feed to the pre-reactor. The HF vapour leaving the pre-condenser is condensed from the gas stream using refrigeration, to give a 99% product which is distilled to give the final product of 99.9% purity. The gaseous effluent is now largely SiF_4, which is absorbed into water and recovered as 30% hydrofluosilicic acid. The calcium sulphate residue from the kiln is usually discarded after neutralisation with lime.

The HF is generated continuously in a horizontal, externally fired rotary kiln. The reaction time is normally 30-60 minutes at 200-250°C, with the HF leaving the generator at 100-150°C. Obviously, the lowest operating temperature at which good yields are obtained is desirable to minimise cor-

* Managing Director, Sharma Consultancy Services (Madras) Pvt. Ltd., 11, 2nd Street, 3rd Main, C.I.T. Extension, Nandanam, Madras 600 035.



BLOCK-FLOW DIAGRAM FOR ANHYDROUS HYDROFLUORIC ACID.

rosion problems. The HF produced is normally in 60 TPD plants.

HF from fluorapatite

In the manufacture of phosphoric acid from rock phosphate and sulphuric acid, hydrofluosilicic acid is obtained as a byproduct. HF is obtained from hydrofluosilicic acid by decomposition.

$$3H_2SiF_6 \longrightarrow 6HF + 3SiF_4$$

SiF_4 produced is recycled to produce more H_2SiF_6 feed by reaction with water.

$$3SiF_4 + 2H_2O \longrightarrow 2H_2SiF_6 + SiO_2$$

The silica produced can be discarded. Synthetic fluorspar can be produced from hydrofluosilicic acid as follows:

$$H_2SiF_6 + 6NH_3 \longrightarrow 6NH_4F + SiO_2$$
$$6NH_4F + 3Ca(OH)_2 + 3H_2O \longrightarrow 3CaF_2 + 9H_2O + 6NH_3$$

The H_2SiF_6 feed solution is neutralised with ammonia to form ammonium fluoride solution and silica is precipitated. The reaction slurry is filtered to remove silica. The filtrate is treated with hot lime to form a slurry of calcium fluoride, the ammonia liberated being recycled. The calcium fluoride is filtered and dried as 'acid-grade fluorspar'.

Uses

Hydrofluoric acid is used in the manufacture of fluorocarbons which find use in aerosols, refrigerants, plastics, solvents and degreasing and foam blowing agents. Hydrofluoric acid is used in the manufacture of aluminium fluoride synthetic cryolite, used as molten cryolite in the electro reduction of alumina to aluminium. For this purpose alu is reacted with HF to get aluminium fluoride and the thetic cryolite is obtained by reacting alumina with HF sodium hydroxide. Aluminium fluoride and synthetic olite can also be obtained by using hydrofluosilicic ac place of hydrofluoric acid.

Hydrogen fluoride is used as an alkylation catalyst i petroleum industry. It is also used for stainless steel ling, uranium processing and in the preparation of all ride salts. It is also used in the manufacture of spec metals, etching and frosting of glass.

Conclusion

The fluorspar reserves in the world are estimated around 300 million tons and may last another 20 years. H the future source of fluorine and its compounds are from rapatite. Right-now efforts are being initiated to recov fluorine chemicals as the pollution laws are becoming s ent. The chlorofluorocarbons are known to destroy the layer the earth's atmosphere resulting in the expos living beings to UV rays which are quite hazardous. Th duction and usage of fluorocarbons may be reduced near future. The fluorine based chemical industry is young — about four decades only. The beauty of the i try is that it is established firmly and its application i expanding thoug tion laws are against most of th duct's usages.

The plight of Industrial Consultants

N.S. VENKATARAMAN
Chief Consultant, Nandini Consultancy Centre, Madras.

It is sad that inspite of large scale growth in industrialiion in the country, there has been no commensurate growth the field of industrial consultancy. It is often said that more nsultant organisations have closed than that have survived the last three decades. Perhaps, such a dismal state preils due to the lack of realisation amongst the government, investors and the industrial financing institutions about necessity to encourage and strengthen the industrial conltancy organisations, to promote qualitative improvement the performance of the industries at all level levels.

The major problem faced by the consultancy organisations their inability to generate adequate business and income meet their routine expenditure and equip themselves with tter facilities for improved performance. Under the circumances, most of the consultancy organisations are reduced the level of a single man team or consist of retired perinnel, who can reconcile themselves to whatever income ey can generate. Such consultancy organisations are, at the me time, unable to promote faith and enthusiasm in the inds of the client's about their capabilities. One gets the npression that such consultancy organisations in the coun- are going through a vicious cycle of inadequate income d business and consequent inadequate capabilities and perrmance. It is imperative that such a cycle shoud be broken the larger interests of qualitative growth in the industrial erformance. One can see that most of the consultancy organations in India who have successfully faced the challenge f survival are either part of larger groups or who have other on consultancy activities in its operations like financial auding, fabrication and manufacturing facilities for equipment. One cannot come across many organisations, who have a successful track record with exclusive and independent consulncy services alone.

Even though the industrial promotional bodies like IDBI, tate Financing Institutions, Small Industries Service Institute and commercial banks maintain their own panel of consultants, there appear to be no organised policy or method o utilise the services of such consultants in appraisal of projects, in monitoring their performance and in assisting them n time of need. Such institutions do not persuade or direct heir investors and industries to utilise the services of such consultancy organisations. Therefore, it often so happens that even major industrial proposals are prepared and implemented by organisations without external consultancy assistance and he financing institutions also appraise and evaluate such proposals with their own staffs and the available talent within the organisation. This only means that there is no recognition of the need for specialists and expert services as a matter of policy. Such an attitude is one of the major reasons for several industries performing far short of expectations and becoming sick within a few years of operations.

The subject matter of identification of investment opportunities, assessment of market potentials, determination of the pattern of financing of the projects, sourcing of technology and even the recruitment of technical manpower have become complicated subjects, in view of the vastness of the areas to be covered, the depth of knowledge and experience required and the need for awareness of the national and international developments from time to time. Obviously, engagement of specialist consultancy organisations, who specialise in particular segments of operations with adequate facilities is vitally necessary for satisfactory execution and decisions. With both the investors and industrial promotional bodies not attaching any importance to such specialist services, it often results in costly mistakes and avoidable problems.

It is essential that the attitude of the investors and industries in the country towards the consultancy organisations should undergo a drastic change for the better. It is often jocularly said that the Indian investors and industrialists would go and listen to the consultants as long as they are serving free and the moment the consultant seeks his fees, the industrialists would run away. This situation partly true makes sad reading. As the consultancy organisations, in their anxiety for economic survival, seek assignments desperately, their plight is mercilessly exploited as much as possible by the industries for getting 'preliminary reports' free of charge. It is an indication of the desperate situation for the consultants that repeated advertisements appear in national newspapers calling consultants to send detailed offer for projects and other consultancy services with full technical and commercial details, when the advertiser would not even care to reveal his name and would provide only a box number for an address. In the advanced nations, it is well known that the consultants charge on the basis of hours spent on the job. In India, consultants appear to be spending more time on unpaid services rather than paid assignments.

It is high time that the government recognises the importance of promoting and strengthening large number of industrial consultancy organisations in the country as a store house of knowledge, talent and expertise. It should think of extending financial aid to such organisations to equip themselves with adequate facilities of data bank and information network.

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Acetal Resins

AJIT JOSHI*

ntroduction

Today, due to the soaring costs of metals, people are trying o replace metals by polymers, especially the engineering lastics. Engineering plastics include Nylon, Polycarbonate, olyacetal etc. These engineering plastics have varying propties and can be used to replace metals in several applicaions. Because of growing consumption and wider listribution, engineering plastics with their own unique characteristics are being developed. In this article, an attempt has been made to review the technical aspects of polyacetal resin, as well as some of the market aspects. Polyacetal resin is not being manufactured in India.

Polyacetals

Polyacetal is an aldehyde polymer and is manufactured from formaldehyde. Polyacetals are also called as "Polyoxy methylenes" or only "acetal resins". There are two forms of acetal resins which are produced commercially — homopolymer and copolymer. The homopolymer (Delrin) of formaldehyde has polymer chain ends stabilised by the addition of acetate groups. Acetal copolymer (Celon) is a copolymer of trioxane and ethylene oxide. The copolymer chain ends are stabilised by hydrolysing to the nearest carbon-carbon linkage, a very stable bond. The chemical structures of homopolymer and copolymer are shown below.

Homopolymer: $CH_3-\overset{O}{\overset{\|}{C}}-O-CH_2-O-(-CH_2-O)_x-CH_2-O-\overset{O}{\overset{\|}{C}}-CH_3$

Copolymer:

$HO-CH_2-CH_2-O-[-(CH_2-O)_x-(CH_2-CH_2-O-)_y-]_b-(-CH_2-O-)_x-CH_2-CH_2-OH$

Both homopolymer and copolymer processes require formaldehyde as a basic raw material.

Properties

Acetal resins' competitive edge, both for the homopolymer and the copolymer is due to its basic lubricity, and its overall balance of properties with an emphasis on stiffness and dimensional stability. Also it has extremely high fatigue resistance, superior resistance to abrasion, organic solvents and oil and low water absorption. However, due to the high oxygen content in the molecules, it is difficult to compound a flame retardant grade material. The properties of homopolymer and copolymer are summarised in table 1.

The homopolymer grades exhibit highest crystallinity with good strength, stiffness and impact resistance. The copolymer grades have random ethyleneoxy or n-butyleneoxy units scattered throughout the polymer backbone. These comonomer units slightly disrupt the crystallinity of the polymer in the solid state, leading to slightly lowered short term strength, stiffness, and impact resistance.

Table 1

Properties of Acetal Resins

Property*	Units	Copolymer	Homopolymer
Sp. Gravity (23°C)		1.410	1.425
Tensile Strength at yield	lb/sq. inch	8,800	10,000
Flexural Modulus	lb/sq. inch	375,000	410,000
Izod Impact strength:			
notched	ft.lb/in notch	1.4	1.4
unnotched	ft.lb/in	20	24
Tensile impact strength	ft.lb/sq. inch	70	100
Water absorption (24 hr. immersion)	%	0.22	0.22
Melting point	deg. C.	165	175
Flammability	in./min.	1.1	1.1
Dielectric Constant (10 to 10 Hz)	-	3.7	3.7
Surface resistivity	Ohm.cm.	1.3×10^{16}	1×10^{15}
Volume resistivity	Ohm	1×10^{14}	1×10^{15}
Dielectric Strength (short time, 90ml sheet)	V/mil	500	500

* By ASTM Test methods

Due to highly crystalline nature of acetals, they are incompatible with most other polymers. Acetals are compatible with elastomers to impart toughness and stiffness. But blends and alloys are generally not available.

Manufacturers

The manufacturers of acetal resins, along with their capacities are given in table 2.

* Present Address: 188/2, Shaniwar Peth, Pune-411 030.

Table 2
Polyacetal: World Capacity

Company	Type	Trademark	Estd. Annual Capacity, MT
Celanese Corporation USA. (Now taken over by Hoechst AG.)	Co-	Celcon	57,000
E.I. Du Pont Nemours & Co. Inc., USA & Netherlands	Homo-	Delrin	45,000 35,000
Hoechst Polymerwerke GmbH Germany	Co-	Hostaform	40,000
Polyplastics Co. Ltd., Japan	Co-	Duracon	40,000
Ultraform GmbH, Germany	Co-	Ultraform	12,000
Asahi Chemical Co. Ltd., Japan	Homo-	Tenac	10,000
	Co-	Tenac-C	5,000
Mitsubishi Gas Chemical Co. Ltd., Japan	Co-	Iupital	10,000
Total			244,000

There are more than 25 grades of acetal resins (including glass fibre filled grades) designed for specific applications.

Applications

The major applications of acetal resins are listed below:

* Industrial and material handling applications; chain links, conveyor links, cams, bearings, wear stops, pollution control equipments, hose connectors, valve bodies, pumps, gears.
* Automotive applications: Fuel handling systems, seat belt buckles, car window drive, window handles, mirror housings, etc.
* Plumbing applications: Components of water meters, faucets, water softners, filters, ball-cock valves, LPG pressure regulators.
* Electronics Applications: Keyboards, telephones, modular components like clips, connectors etc., audio/video tape cassette hubs, audio/video players.
* Appliances applications: Various components for refrigerators, washers and dryers, dishwashers, mixers, sewing machines.
* Consumer applications: Aerosol valves, mascara wands, cigarette lighters, toys, sporting goods, hardware.
* Irrigation and agricultural applications: Sprinkler nozzles, pump housings, impellers, knobs, hydraulic connectors, bearings, seed applicator discs.
* Miscellaneous: Various components of Xerox & Fax machines, staplers, paper punch, tooth brush, venetian blind/curtain puller components.

Present market

Since there are several competing engineering plastics, it will be worthwhile to look into the consumption of these engineering plastics. Table 3 shows the consumption of various engineering plastics during 1988 and the estimated p growth rates are given. The ratios of consumption with respe to polyacetal are also given.

Table 3
U.S. Consumption of engineering plastics (1988)

Material	Consumption '000 MT	Ratio	% G.R
A.B.S.	563	9.71	4
Nylon	254	4.38	10
Polyacetal	58	1.00	5
Polycarbonate	196	3.38	9

As can be seen from the table the polyacetal consumpti is the least among the four major engineering plastics.

Table 4 gives the consumption of engineering plastics India for the year 1985-86. By comparing this Indian co sumption with the USA consumption, it is evident that t Indian market is very small.

Table 4
Consumption of engineering plastics in India (1985-8

Material	Qty. MT	Ratio
A.B.S.	3,800	9.50
Nylon	4,500	11.25
Polyacetal	400	1.00
Polycarbonate	600	1.50

According to one report, the consumption of polyacetal sins in USA during 1987 was about 56,000 MT. This market expected to grow at 5% per year and reach about 73,000 T in 1992. During 1987, the percent share of different applications of polyacetal resins in the US market were as follows (Table 5).

Table 5
Consumption pattern of polyacetal (USA 1987)

Actual Uses	Percentages
Mechanical/Industrial	28
Transportation	20
Consumer/Recreation	18
Building Construction	11
Electrical/Electronic	13
Others	10

It may be reasonably assumed that this same consumption pattern will prevail in India, for polyacetal, except in the electronic sector, where it may be as high as 30-40%. Since the per capita consumption of all the plastics in India is very low as compared to that of USA and world, considerable efforts are required to increase the plastic consumption in India. There are several constraints to achieve this. The following are the major ones:

* Cost of engineering plastics are higher than or comparable to metal prices (on per kg basis). All the chemical prices are higher in India as compared to those of USA.
* High duties on all products in India.
* Low or no awareness of different plastic materials which can replace different metal parts.
* Presently acetal resin is not manufactured in India.
* Also lack of knowledge of various grades of different plastics which are specifically designed for specific applications.
* Lack of experience with processing of various plastics and therefore reluctance to change a particular raw material by some plastic.

Today, the price of acetal resin in India, is in the range of Rs. 60 to 70 per Kg. including duties etc. Government of India has reduced the duty on acetal resins from 98% to 68% in this year's budget. Table 6 gives comparison of costs of different engineering plastics and metals.

Ratios in terms of Rs./Kg. and Paise/cc give easily understandable comparison of the prices of metals and other polymers with respect to polyacetal in India. In India, the present market for polyacetal is estimated to be about 1500 to 2000 MT per year. The demand for acetal resins is expected to reach 10000-15000 MT by the year 2000 AD.

Several companies in India have expressed the desire to manufacture acetal resin. Table 7 gives the sanctioned polyacetal capacities in India.

Table 7
Sanctioned polyacetal capacities in India

Name	Capacity (MT)
Cibatul Ltd.	5,000
Haryana State Ind. Dev. Corpn. Ltd.	N.A.
Kanoria/Renukoot	5,000
Polyolefins Ind. Ltd.	5,000
Shri Ram Fibres Ltd.	5,000

(N.A. Not available)

If all these companies go ahead with the projects, the total capacity available in India will be about 25000 MT. But at least 2 or 3 companies may go ahead installing the plants, the polyacetal capacity may become around 10-15000 MT by the year 2000 AD.

Table 6

Comparative Costs (India 1988)

Material	Sp. Gr.	Rs./Kg.	Ratio	Paise/cc	Ratio
Polyacetal	1.42	80	1.00	11.36	1.00
Polycarbonate	1.20	120	1.50	14.40	1.27
A.B.S.	1.05	60	0.75	6.30	0.55
Nylon	1.14	75	0.94	8.55	0.75
Aluminium	2.70	48	0.60	12.82	1.13
Zinc	6.60	49	0.61	32.27	2.84
Steel	7.80	8	0.10	6.08	0.54
Copper	8.80	98	1.20	85.36	7.51

To promote the market for polyacetal in India, a detailed study of the market and end users is needed. Several points will have to be covered.

* Major end use sectors with specific product identification.
* Problems faced during processing.
* New products which can be developed.
* Products in which previous raw materials (Metals/Plastics) can be replaced.
* Increasing the product awareness.
* Tapping the export potential of the acetal resins as well as end products.

Latest developments

Hoechst Celanese are working on some 2000 new applications in their R & D labs. One Hoechst Celanese plant for polyacetal copolymer with a capacity of 20000 MT per year will start operating in 1990, in Taiwan. Also the polyacetal capacities in USA, Germany & Japan are being expande

Hoechst A.G. has developed a new generation of mod fied acetals called 'Tuf-X'. The new 'breakthrough' is tl ability to modify the base polymer so that other materia can be alloyed with it and have better adhesion to fillers ar reinforcements.

Du Pont will set up a new plant of 18000 MT/Yr. capa ity for Delrin in Singapore by June 1990.

Sources

1) Du Pont Far East Inc.
2) Voltas Ltd.
3) Polyolefins Industries Ltd.
4) Ency. of Chemical Technology - Kirk and Othmer (3 Ed.)
5) Ency. of Polymer Science & Engineering (2nd Ed.)
6) Chemical Marketing Reporter.

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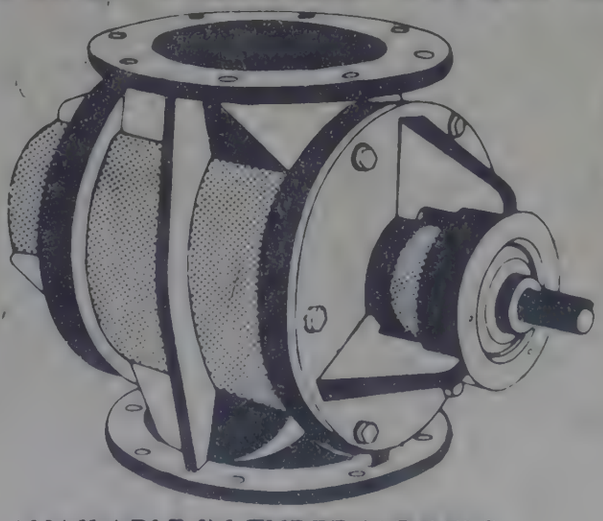

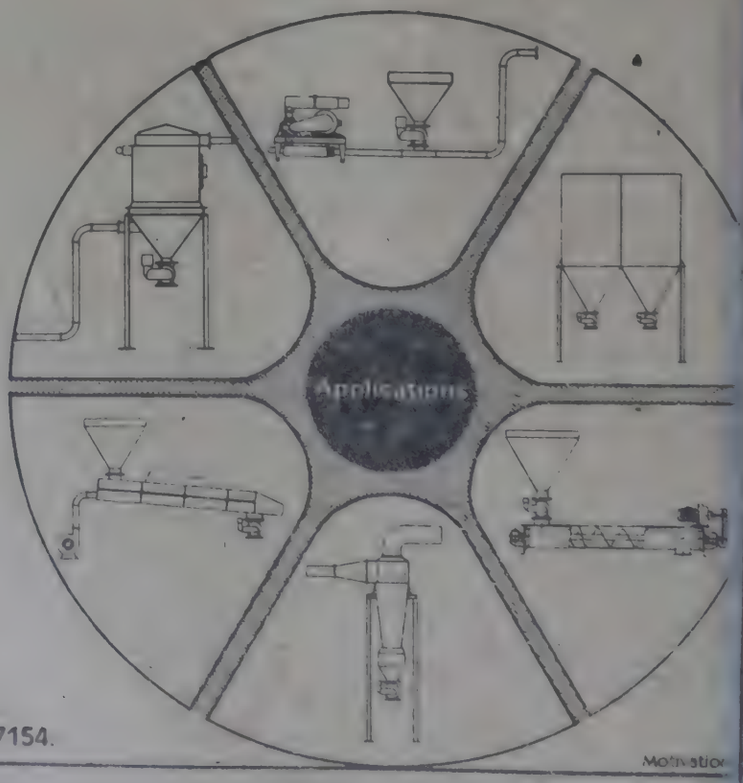

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NEWS FROM ABROAD

ICI GIVES GO-AHEAD FOR TAIWANESE PTA PLANT

ICI, the world's second largest producer of pure terephthalic acid (PTA), is going ahead with plans to invest £150m ($237m) in a wholly-owned PTA facility in Taiwan. The plant represents ICI's biggest single investment for around ten years.

The move is part of the company's overall strategy to significantly increase its investment in the Asia/Pacific market, where it is under-represented at present. This region currently represents only 8 per cent of ICI's total business, but the company aims to increase this to 15 per cent by 1995 and to 20 per cent by the year 2000. The Asia/Pacific region is expected to account for almost 40 per cent of the world growth in chemical demand in the period to 1995.

The new PTA plant, which will have a production capacity of 350,000 ton/year, is to be located on an industrial estate in northwest Taiwan. Although ICI has obtained all the necessary permits for its construction and has carried out a thorough environmental impact assessment, it will not disclose its specific location because of potential local public/political pressure. Chris Hampson, ICI director, gave his 100 per cent assurance that the plant will create no ecological problems, and said there will be "minimal effluent."

Paraxylene and acetic acid raw materials for the plant will mainly be imported from Japan and other parts of South East Asia.

The Taiwanese PTA market is the largest in the world. China American Petroleum Co. (Capco) is to bring on stream a third PTA production line later this year and a fourth line is scheduled to begin production in 1990, bringing Capco's total production to 1m ton/year.

However, ICI is confident the PTA market will remain robust and grow to 1.6m ton/year by 1994, from 1m ton in 1988. Product from the new plant will supply ICI's customers in Taiwan and, initially, around 10 per cent will be exported to other countries in the region.

ICI's joint venture PTA project in Thailand, in which it holds a 40 per cent share, is due to start up in 1992. The balance of the £130 m investment will be held by the Saha Union Corp, and other Thai companies, including the East Asiatic Co. The board of investment certificate for the plant has already been awarded.

Other investments in the region include a speciality chemicals plant in Thailand, a polyester films plant in Japan, and the doubling of capacity at its acrylic monomer plant in Taiwan. ICI foresees further future investments in the region, focusing on products relating to specific market opportunities, such as textile intermediates, polyurethane, paints and specialized industrial chemicals.

Meanwhile, ICI Australia has announced a takeover offer for the 25 per cent of ICI New Zealand currently in the hands of private shareholders. The offer values the whole company at NZ$ 117.8m. The offer of NZ$2.80/share is higher than any previous market price. Approval has already been given by the overseas investment commission.

SCHERING SHELVES U.S. PLANS

West Berlin-based Schering group has shelved, at least temporarily, plans to build a $50m plant at Mapleston, Illinois, for saturated and unsaturated fatty alcohols. It has based its decision on the prospect of overcapacity in the US fatty alcohols market by the beginning of the 1990s.

Sources close to the oleochemicals market suggest that Henkel's $500m acquisition of Emery may have prompted Schering's withdrawal from its own project, given the intense competition which may result for Schering. Henkel, meanwhile, is sticking by its plans to build a 30,000 ton/year fatty alcohols facility in Cincinnati, Ohio, scheduled to go on stream in 1991.

Schering's plant was to have gone on stream in the first quarter of 1991 at the site of its US subsidiary, Sherex. It would have given Sherex capacity to produce up to 60,000 ton/year fatty alcohols.

DOW DETAILS HUNGARIAN JV

Dow Chemical has confirmed its joint venture agreement with the Hungarian companies, Nitrokemia and Chemolimpex, recently, and has released further details.

The new company, Donichem Chemical, is 50 per cent owned by Dow, 45 per cent by the plastics, chemicals and agrochemicals producer Nitrokemia, and 5 per cent by the chemical trading company Chemolimpex.

Donichem, which represents an investment of $14m, will initially manufacture Styrofoam extruded polystyrene foam insulation products, and intends to gain a significant share of the Hungarian insulation market.

Work on the manufacturing plant, which will be located at Nitrokemia's site at Balatonfuzfo, is scheduled to start soon and production is expected to begin by mid-1991. The final capacity of the plant will be 100,000 cubic metres.

SABIC REVEALS EXPANSION PLANS

Sabic, the Saudi basic industries corporation, is planning to invest in Western Europe for the first time. Speaking in London recently, Ibrahim Ibn Salamah, Sabic vice chairman and ceo revealed the company's willingness to, "discuss with potential partners the possibility to enter into downstream industrial joint venture development within the EC."

Salamah stressed that the joint venture concept has been a key factor to Sabic's success and growth. "It works well for us and for our partners and we intend to continue to work with our current partners in expanding present facilities." Sabic is now inviting companies to establish further joint ventures.

Salamah revealed that Petrokemya's cracker at Al Jubail and Yanpet's cracker at Yanbu have received initial approval. Construction will proceed once cost estimates have been made, which Salamah predicts will be in two months.

Both crackers will be able to use ethane and naphtha as feedstocks. Salamah also revealed that each cracker would have a minimum ethylene capacity of 500,000 ton/year, plus 300,000/year of propylene and 100,000 ton/year of benzene.

Sabic plans to use ethylene in planned downstream activities. The company has not yet decided on the investor for a PP plant although it could be Petrokemya's Salamah added.

Salamah revealed that the 100,000 ton/year benzene from Petrokemya's plant has already been earmarked. The Petrokemya benzene plus 200,000 ton benzene from an aromatics complex planned by a venture capital group in Saudi Arabia, will be enough feedstock for a good size styrene plant in Saudi Arabia added Salamah.

More details concerning Ar Razi's methanol plans have emerged. The Sabic and Mitsubishi Gas Chemical joint venture will go ahead with expansion plans.

A doubling of capacity has been on the cards for some time but market conditions have thwarted such ambitions. Salamah did not reveal the scale of expansion.

ALLIED COLLOIDS BROADENS BASE

Allied Colloids, the UK-based industrial chemicals manufacturer, is significantly expanding its activities by moving into the fine chemicals field.

From its traditional base of water treatment chemicals, performance chemicals and agrochemicals, the company is now looking to widen its range of customers to include the pharmaceutical industry.

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Chemical Markets Abroad

THIRD QUARTER PROPYLENE CONTRACTS STUN MARKET

The recently concluded third quarter propylene contracts stunned and surprised the market as BASF and Deutsche Texaco settled at DM825/ton FD, a sharp contrast with July monthly contracts, which were settled at DM 965-975/ton. The quarterly deal is believed to be for chemical grade product. Although BASF stresses it has one price idea for propylene it expects to reach final settlements by the end of the month.

Opponents of the contract stress that Deutsche Texaco has never been a major player in contract negotiations, so it is a surprise to see them assume the role of market leader. Since being taken over by UKBW, Deutsche Texaco, which produces propylene at it's refinery at Karlsruhr, has had its status enhanced.

Many in the market had hoped that a single contract price for propylene could have been agreed, encapsulating both grades of material. The early settlement makes this unlikely, say many players.

Hoechst has followed BASF's lead and settled a number of contracts with Veba and UKBW (ex-UK Wessling). It is interesting to note that the company has yet to finalize agreements for 100 per cent basis material. BASF has also settled with BP, as has Veba with Huls.

Supporters of the contract say, now that the market for both grades is no longer tight which led to the initial segregation of prices, a drop in numbers is due. Polypropylene prices have lost over pf25/kg in quarter two, while other derivatives face continued price pressure and cutbacks in production. Feedstock suppliers should share some of the burden of a falling market, the argument goes. Hence the figure of DM 8.25/ton, may be acceptable for both grades.

Many polymer grade producers, who have yet to settle contracts, say they expect negotiations to be drawn out and last for weeks. Polymer buyers are using the DM 825/ton figure as a bench-mark and are refusing to consider what producers call "reasonable figures." Before the settlement numbers nearer DM925/ton were being considered. One producer said he now expected polymer grade prices to have a DM30-60 ton premium on chemical grade.

It is pointed out that with monthly contract settlements for July being reported at DM965-975/ton FD, for polymer product, quarterly settlements cannot go DM150/ton below this.

CANSULEX STRUGGLES

Cansulex, the Canadian sulphur export agency, is having difficulties in achieving its 1989 export sales targets. One of the country's major sulphur terminal operators, Vancouver Wharves Ltd., say exports to the end of May are 50 per cent down on last year's figures.

In light of an ongoing price row between itself and India over phosphoric acid prices, Morocco, one of Canada's largest customers, has frozen shipments of sulphur. India, meanwhile, has ceased imports of Moroccan phosphoric acid, after failing to agree contract figures.

Meanwhile, Amoco Canada is set to leave Cansulex and market its sulphur away from the consortium. The subsidiary recently acquired Dome Canada.

SABIC EURO OFFICE

Sabic vice chairman and ceo, Ibrahim Ibn Salamah, launched the company's new European marketing operation, recently. Speaking in London Salamah said, Sabic Marketing Europe Ltd. is an active response to 1992, with its potential of 320m new customers. The trend towards global trading provides further impetus for a European operation.

The company predicts that $150m worth of basic chemicals and commodity business, will go through the London office in 1989.

Sabic's Petrochemicals and plastics sales worldwide are this year expected to reach $3bn, 20 per cent of business is in the Saudi domestic market, with Europe accounting for 18-20 per cent. By far the biggest outlet for Sabic's products is South East Asia which takes 50 per cent of goods, the US accounts for 8 per cent.

ERDOLCHEMIE INVESTS

Erdolchemie, a joint venture between BP and Bayer, is to invest DM500m ($248m) in its plant at Worringen, West Germany. Plans include the modernization and re-commissioning of a 240,000 ton/year ethylene cracker, and the construction of a 125,000 ton/year linear low density polyethylene unit, using BP Chemicals' licensed process technology.

By 1990, the venture hopes to hike its ethylene capacity to 740,000 ton/year. The company feels re-commissioning a cracker is cheaper and quicker than building one from scratch. If the market dictates, the company will boost ethylene capacity by a further 260,000 ton/year, through debottlenecking.

TiO_2 EXPANSIONS MAY EXCEED GLOBAL DEMAND

World titanium dioxide (TiO_2) demand is expected to reach 3.3m ton/year by 1993, a growth rate of 3 per cent/year. But promised capacity expansions are not all expected to materialize.

Total new capacity additions and expansions, due to come on stream by 1993 in an attempt to ease the supply/demand balance, amount to about 900,000 ton. World consumption last year was 2.9m ton, representing an effective capacity utilization rate of 100 per cent.

However, a new report on titanium dioxide from US research company Freedonia, warns that projected figures are likely to prove an overestimate. "A more realistic projection of new production capacity through 1993 is between 600,000 and 700,000 ton," said analyst William Weizer.

This, he said, will allow for cancellations or construction postponements and the potential close-down of plants producing TiO_2 using the sulphate process. Last month the EC adopted a directive banning the dumping of acid waste from this process.

The latest company to publicize expansion plans is the US giant Du Pont, which is to build a 60,000 ton plant based on chloride technology in Minas Gerais State, Brazil. The plant in due to come on stream in 1994, by which time chairman Jorge Nelson Rosas expects domestic demand to have reached 199,000 ton/year from today's figure of 75,000 ton/year. The other, sole domestic supplier to the Brazilian market, with an output of just 50,000 ton/year, is a Bayer and Andrade Gutierrez joint venture called Tibras.

Two Japanese companies, Tohoku Chemical and Teikoku Kako, have also recently announced plans to build new plants — rare announcements in a market which up until now has relied exclusively domestic demand. Both plants will produce 12,000 ton/year and are due to come on stream in 1990 and 1991 respectively.

These, however, are expected to do little to ease the critical supply/demand imbalance in the Japanese market, where strong increases in domestic demand are being met only by reducing exports.

Japanese producers increased capacity by 9 per cent in 1988 to 265,000 ton, of which all but 402 ton was accounted for by domestic deliveries — up for the third year in a row — and by exports — down for the third year in a row.

In terms of demand, the world's fastest growing region is Asia. According to Freedonia, it will grow 4.2 per cent/year to 1993 and reach 840,000 ton/year by 2000 against 513,000 last year. This compares with a figure of 1.6m ton by the year 2000 in North America, 980,000 in Western Europe and 430,000 attributed to the rest of the world.

Continued tight supplies will do little to ease pricing pressures Geoff Allen, analyst with Country NatWest Securities, anticipates prices will rise by at least 2.5 per cent and 3 per cent/year up until 1993. He is expecting to see a repeat of this April's 5 to 7 per cent price hike before the year is out.

These fiures do not include additional cost burdens placed on producers by the EC's pollution reduction measures.

Roger Clegg, group environmental services manager with Tioxide, estimates that reducing acid waste from sulphate production processes, by either recycling or neutralization, will add another 10 to 15 per cent to manufacturing costs. All agree these costs will have to passed on to users.

Coating, papermaking and plastics applications are expected to continue to account for nearly 90 per cent of world demand for titanium dioxide in the near to medium term. Lack of available substitutes means TiO_2 use in plastic applications may well increase.

Coatings are the largest application with over half the market, but Freedonia expects it to grow at a slightly below average rate due to moderating housing starts and competition from products that do not require coatings.

STYRENE SPOT PRICES PLUMMET

Styrene spot prices have plummeted to $620-650/ton cif NWE, for T1 material, after standing at $770-780/ton cif NWE, two weeks ago. Some players have predicted that prices could drop even further to $550/ton cif NWE, before bottoming out.

Once contracts for quarter three had been settled, at DM1,660/ton, down DM400/ton, then spot prices followed as expected. Players have been surprised by the speed of the drop. Producers in the market before the contract settlements, no longer appear as buyers. Support for prices has now evaporated.

Lack of purchasing from downstream customers and relatively high stocks in Europe have contributed to the slump.

Polystyrene prices in the Far East have dropped to $900/ton from $1,300/ton in the first quarter. No short term upturn in demand or prices is expected in the region.

Environment

EST GERMAN CABINET SSES TOXIC WASTE SPOSAL ACT

West Germany's federal cabi- t has passed the long awaited xic waste disposal act, termed the environmental ministry, hich drafted the legislation, nique in the world." The legis- ion, known as TA Sonderabfall, gulates waste classification and tlines how each type is to be sposed.

At the heart of the law is pro- sion requiring manufacturers or ndlers of waste classified as to- c to provide proof that it has en safely deposited or burned at it is not suitable for recycl- g.

Another requirement stipulates at certain categories of potenti- y hazardous waste must be trea- d before being deposited in ndfills or burned. This includes lvents used in dyes or coatings, ectroplating sludge containing anide and waste containing ar- nic.

The list of substances classifi- l as toxic contains 350 different oducts, three times as many as eviously categorized, according federal environment minister aus Topfer.

The environment ministry esti- ates that some 5m ton of the 20m ton/year of waste created West Germany should be clas- fied as toxic. TA Sonderabfall ipulates that 2m ton/year of to- c waste is to be incinerated owever, facilities capable of bur- ng toxic waste can handle only 00,000 ton/year. A further 00,000 ton/year of toxic waste is eposited outside West Germa- y.

The new toxic waste act is subject to approval by West Germany's upper house of parliament, the Bundesrat. Topfer said he expects some opposition from the parliament but maintains he will also press for the harmonization of toxic waste disposal laws within the EC.

Meanwhile, the cabinet has set its priorities for support of environmental research and technological development in the period 1984-94. According to the federal minister for research and technology, Heinz Riesenhuber, the Germany government's long-range goal is to prevent environmental destruction before it occurs, "based on the principle that environmental research and technological development should go hand in hand."

Some DM550m ($286m) has been budgeted for 1989, with spending to rise 4.2 per cent/year. The emphasis of this government-backed research will be on climate changes and the development of new antipollution technologies in selected areas, including emissions control and the control of discharges from oil and chemical tankers.

EAST-WEST LINK ON POLLUTION

The West German government has agreed to support antipollution projects planned by the East German (GDR) government to the tune of DM200m ($104m) over a three-year period. A contract agreeing cooperation on six pilot projects is to be signed by the two governments this month.

Two of the planned projects deal with the recycling of mercury and chlorinated hydrocarbons at Chemische Werke Buna in the GDR. According to West German environment minister, Klaus Topfer, this should reduce discharges of mercury into the river Elbe by 3 ton/year from the current level of 22-25 ton.

A third project calls for the installation of a high-temperature waste incineration unit at a pharmaceutical plant in Dresden, expected to reduce discharges of chlorinated production residues into the Elbe by 4,000 ton/year.

Two additional projects, slated for power stations at Magdeburg and Staaken, call for the installation of modern fluidized-bed processes to reduce emissions of sulphur dioxide by around 10,000 ton/year.

U.S. PHOSPHATE PRODUCTION RISES

In the first quarter of 1989, US production of phosphate rose to 12.5m ton, against 10.8m ton in the same period last year. Domestic usage registered a slight increase to 10.4m ton from 9.8m ton, while exports rose to 2.2m ton in quarter one against 2m ton in quarter 1 of 1988.

Based on available data, the rate of production is projected to reach some 52.2m ton/year in 1989, over 7.2m ton higher than last year.

In 1988, US phosphate export prices jumped to $26.36/ton from $24.66/ton. By the end of last year US domestic prices stood at $29.74/ton, from $16.88/ton at the beginning of.

Observers say the rapid rise in domestic prices is part of a market adjustment to what is o changing environment. In the mid-80s the phosphate industry entered a slump

News About New Projects

QATAR PLANS NEW $500M PETROCHEMCAL COMPLEX

Plans for a new petrochemical complex at Umm Said in Qatar are beginning to crystallize, writes **Natasha Alperowicz.**

Promoted by the Qatar General Petroleum Corp (QGPC), the project is expected to be set up in a joint venture. Phillips Petroleum of the US and other potential partners from Europe and Asia (including India), are in talks on the $500m investment.

Qatari sources close to the project said that QGPC is reviewing and evaluating different alternatives connected with the development of the North Field Gas project which is expected to yield 800m cubic feet/day when it begins production in 1991. Methane, ethane, propane, butane and naphtha will be recovered.

The plan is expected to be implemented in two stages. To begin with, it is intended to fully utilize ethylene produced by the existing 280,000 ton/year ethane cracker at Umm Said, operated by Qapco, a joint venture between QGPC and Orkem (16 per cent).

This currently feeds a 140,000 ton/year CdF Chimie (now Orkem) process low density polyethylene (ldPE) plant on site. Surplus ethylene is sold on the market.

A new 140,000 ton/year ldPE or lldPE facility is expected to be constructed at a cost of some $100m. BASFs' and Norsolor's technologies are being evaluated for ldPE and Carbide and Du Pont for lldPE.

An inhouse feasibility study now underway is looking at two alternative proposals for the next stage of development at Umm Said — either to double the cracker's capacity to 600,000 ton/year or to expand the facility by 50 per cent to 450,000 ton/year.

Downstream plans focus on two units — a 150,200,000 ton/year ethylene glycol facility, which would use roughly half the extra ethylene, and a new polyethylene plant at a later stage. A decision on the project is expected early next year with completion due some three and a half year's later.

Phillips' involvement could give it access to new ethylene supplies and, provided not all is consumed downstream at Umm Said, the company could ship some material to its Singapore operation, where it is likely to be in short supply.

The buoyant polyethylene market in South East Asia could lead to investment in a third PE line by Phillips Petroleum Singapore Private Ltd. a joint venture in which Phillips holds 85.7 per cent and Sumitomo 14.3 per cent.

The company operates a 160,000 ton/year linear polyethylene facility on Pulan Myer Merban. Ethylene is purchased from the Shell/Sumitomo cracker, which could not supply a third line.

PETROMONT HDPE, ETHYLENE PLANS

Petromont Inc., a 50-50 joint venture between Union Carbide Canada and the Quebec government, is to build a world-scale **Unipol** process polyethylene facility as part of a Can$200m ($167.2m) modernization and expansion of its Varennes, Montreal East complex.

Petromont's plan includes the addition of a sixth cracking furnace to boost the cracker's capacity from 220,000 to 265,000 to year of ethylene

In a separate development, t company plans to double the c cker's capacity. Petromont is 31-1/2 per cent partner in Soligaz consortium project wh plans to bring LPGs from West Canada to Montreal. This pl still in feasibility study pha will enable it to double ethyle capacity.

Cornerstone of the present r dernization and expansion pr ramme will be construction of 200,000 ton/year high density lyethylene plant. The unit will place an existing 100,000 t year ldPE facility at the site. addition to feeding the PE u the cracker supplies 60-70,(ton/year of ethylene to Union C bide Canada's ethylene ox plant at Varennes, and s quantities to Himont's copoly polypropylene production facil

PE will be marketed bp Pe mont in Canada and by Union bide Corp in the US and out North America.

HYUNDAI PICKS PHILLIPS PROCESS

Hyundai Petrochemical Co. use technology licensed Phillips Petroleum Co. to pro 100,000 ton/year linear polye lene at its $2bn petrochem complex in Daesan, some 80 es southwest of Seoul, Korea.

Output from the plant is e ted to be used in blow moul pipe, film, monofilament, flat injection moulding and other plications. Completion is du early 1991.

MW Kellogg last year wo contract to engineer Hyun 350,000 ton/year cracker and SF has signed a deal to li its ldPE technology for a 10(ton/year facility.

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Biotechnology

MOBAY BACKS OFF CADMIUM PIGMENTS

Mobay (Pittsburgh), a Bayer USA firm, has opted to remove non-degradable cadmium pigments from all of its thermoplastic colours that contain the chemical by 1990. The company says that is affecting more than 2,000 colours for eight engineering resins, but should have little effect on pricing. Cadmium pigments are "potentially hazardous when handled as pure pigments." Mobay notes that Bayer AG in West Germany has also decided to drop manufacturing resins that incorporate the pigments. A spokesman for Ampacet (Mt. Vernon, NY), a producer of colour additives for plastics, says that Mobay's move is part of an industry trend; his own firm dropped cadmium pigments a year and a half ago.

GENENTECH, XENOVA COLLABORATION

Biotech firm Genentech and pharmaceutical research and development company Xenova are going to work together to develop a series of drugs to act as cell receptor agonists and antagonists These "small non-proteinaceuos molecules can mimic or modify the activity of the body's natural cell regulatory processes," Xenova says, and will be used for cardiovascular disease and growth control applications.

SMALLER IS BETTER ?

FMC (Chicago) says it has developed a powder microcrystalline cellulose that has an average particle size of 13 microns, or about half that previously available. The company sees applications in electrorheological fluids, reinforced plastics, paints, pesticides, and ceramics. Late this year FMC expects to debut powder in the 5-10 micron range.

DUTRAL SALE GO-AHEAD

Montedison has completed the purchase of the polyolefins elastomers division of Ausimont's subsidiary Dutral for L245bn ($1.69 m). The sale follows a unanimous agreement by Ausimont's board of directors, based on the approval of an independent committee appointed by the board to review the transaction. The committee received an opinion from its financial advisor. Dillon, Read and Co, that the L245bn purchase price valuation was fair to Ausimont's public shareholders. Montedison's original offer was L215 bn.

DOW INCREASES MAGNESIUM CAPACITY

Dow Chemical is bringing capacitp at its Freeport, TX magnesium facilities to over 90,000 mt/year. This is the plant's fourth incremental capacity expansion since November 1987. About 90% of the magnesium industries inventory drop over the last two years has come from Dow's inventory, says C.W. Nelson, the company's magnesium international marketing manager.

DU PONT TO CENTRALIZE AGROCHEM RESEARCH

Du Pont is planning to centralize and expand its agrochemicals research in Europe by setting up a new research base in Mantes, near Paris. The new centre is due for completion in 1991.

The company has also recent acquired a small local packagir company, Cedel, a further sign its renewed interest in the Frenc market. The Rouen-based con pany has sales of FF30m/ye ($4.6m) and employs 65 peopl

According to Eduard Van Wel president of Du Pont France is possibility. Likely targets are agrochemical or engineering po mer unit.

BRUCELLOSIS VACCINE

The French Institut National la Recherche Agronomique h been appointed by the Wo Health Organization to examin Chinese vaccine against bruce sis.

Bovine brucellosis has b eradicated in most developed untries, but sheep and goat b cellosis, capablt of transmiss to humans, still exists around Mediterannean.

CELLTECH SIGN DEAL WITH BOEHRINGER

Celltech has unveiled plan collaborate with US-based Bo ringer Ingelheim Pharmaceuti on humanized mouse monocl antibodies.

In the early phase of the ag ment, Celltech will engine mouse monoclonal antibody contain human elements w Boehringer Ingelheim will eva te as a therapeutic agent.

Neither partner would elabo further on indications the po tial therapy would treat, but intend to subsequently collabo on product development, regi tion, manufacture and marketi

This is the first time Cell has revealed such a deal, altho others have been signed and s are imminent.

NEWS FROM JAPAN

ARGE-SCALE ABS RESIN MPORT FROM TAIWAN GREED ON

Matsushita Electric Industrial o. — Japan's leading maker of ousehold electrical appliances — has agreed to import a large uantity of general-purpose ABS opolymer from Chimei Industrial o. (Taiwan) with technical support provided by Mitsubishi Petochemical Co., a major Japanese etrochemical company.

Back of the agreement is the act that the Taiwanese company s scheduled to scale up the production capacity concerned from ne current 350,000 t/y to 00,000 t/y at year-end, thus outacing General Electric (US) and ecoming the world's largest BS-resin producer. The expandd capacity is almost equivalent o the combined capacity of the 0 Japanese ABS-resin makers.

ABS resin is used in large quntities for household electrical ppliances. Matsushita envisions ssening the trade imbalance beween Japan and Taiwan by imprting the product.

Mitsubishi has been supplying ne Taiwanese company with raw aterial styrene monomer and tehnical co-operation has been esblished between them. Mitsubihi's technical service for Matsuhita is indispensable to the greed-upon ABS-resin venture. he former company claims it will mit its involvement in the venure to technical support to avoid ringing confusion to the Japaese ABS-resin market.

There has been a fear in the Japanese ABS-resin industry that Chimei will launch an aggressive export drive aimed at Japan late this year, when the raw material situation is expected to be stabilized. The Taiwanese company was unable to do so from last year thru early this year due to shortage of and price hikes for raw materials (styrene monomer and acrylonitrile). Chairman H. Wenlung of the company promises: "We won't disorder the Japanese market."

MITSUBISHI TOATSU LARGE-SCALE PLANT INVESTMENT

Mitsui Toatsu Chemicals, Inc. is scheduled to invest Y50 billion in production facilities in fiscal 1989 ending next March in an effort to build up its basic operations and promote new businesses: the amount is far larger than the fiscal 1988 equivalent reaching Y35 billion.

Of the total amount Y22 and Y6 billion will be used for building new plants and implementing measures to save energy and resources, respectively. In more concrete terms, the company plans to scale up production capacity for phenol from 100,000 to 120,000 tons a year through debottlenecking of its Osaka plant.

It also plans to expand from the current 30,000 t/y to 50,000 t/y production capacity of an MT-chlor-process plant designed to produce chlorine from hydrogen chloride. The planned capacity expansion is linked with production expansion for MDI and TDI, both of which are raw materials scaled up production capacities for urethane: the company has for the two products from 30,000 t/y to 55,000 t/y and from 30,000 t/y to 35,000 t/y, respectively.

In addition, it envisions building a 40,000-t/y MMA-monomer plant at its Osaka factory in cooperation with Kyowa Gas Chemical Industry Co. Start-up of the new plant is scheduled for January, 1991.

The company resumed dividend payments in the business term ending in March, 1987: this was the first dividend payout after that if March, 1976. It has shifted its business style to the offensive since then but kept plant-and-equipment investment to the Y20-billion level in the initial stage in a bid to improve its financial structure. Last year it expanded capital investment ti Y35 billion in response to the tight supply-and-demand situation for basic chemicals including phenol and MDI.

JAPAN DEPENDS ON S. AFRICA, MEXICO FOR FLUORITE SUPPLY

Japanese hydrofluoric-acid makers have begun to import fluorite from South Africa and Mexico, taking into account the current political unrest in China — a leading fluorite supplier for Japan. Japan imported last year roughly 610,000 tons of fluorite including 305,000 tons of acid-grade product, of which 235,000 tons came from China.

Import prices for China-source fluorite have risen by 25% on a CIF basis and South African and Mexican products are 50% higher than Chinese ones. Markets prices for fluorine products will, therefore, be raised for certain.

China had been unable to ship fluorite since mid-May due to political/economic unrest. The cou-

ntry recently resumed shipments of those stocked at ports but transportation of fluorite from inland mines to ports has yet to return to normal levels. Japanese makers of hydrofluoric acid cannot help but raise the shares of expensive non-Chinese products. The situation is identical with regard to overseas countries, so the international supply-and-demand situation for fluorite will become increasingly tight.

Japanese demand for fluorite has been on an upward trend as a whole in response to growing demand for fluorine products used for semiconductor etching, though Japan is scheduled to reduce CFC production by 30% as from this July in accordance with regulations on specified CFCs.

China is the world's largest fluorite supplier with her annual output of the product reaching 800,000 tons in 1988: combined world production in the same year stood at 1,800,000 tons.

TEIJIN TO MASS-PRODUCE NYLON 46-RESIN COMPOUND

Teijin Ltd. plans to start during this year production of several hundred tons a year of nylon 46-resin compound (moulding material) at its Iwakuni factory (Yamaguchi Prefecture), keeping pace with the completion in the Netherlands of the 20,000-t/y base-polymer plant planned by DSM (Netherlands).

The Dutch company is endeavouring to exploit the Japanese market for the base polymer concerned in a team-up with Teijin, Japan Synthetic Rubber and Unitika.

Teijin aims at commercializing special-grade products including inorganic filler-added and para-type aramid fiber-reinforced ones. The latter will be able to reduce the weight of applied products since its specific gravity is low. In addition, it has excellent dimensional stability.

Potential applications of the special-grade products are electronics devices and car parts including connectors, fasteners and bearing cages.

The company is producing the special-grade products in sample form. It has recently developed pitch-based carbon fibre (tensile strength: 600 kg/mm2; modules of tension 70 t/mm2). It is considering combining the new product with the base polymer.

Nylon 46 has the disadvantage of absorbing much more water than other nylon resins do since it incorporates amide groups at the comparatively high rate. It is considered that transformation of the product into polymer alloy will furnish a solution for overcoming this disadvantage.

MITSUBISHI RAYON TO BEGIN ABS RESIN PRODUCTION IN STATES

Mitsubishi Rayon Co. will start production in the U.S. of acrylonitrile-butadiene-styrene (ABS) resin to be used for electrical-machinery and electronics parts as well as automotive parts. The company will soon establish a joint venture in the U.S. together with Network Polymers, Inc. (NPI) of the U.S. and Marubeni Corporation. It will put into operation this August a 10,000-t/y ABS-compound plant in Akron, Ohio by investing $3 million.

The new firm — Diamond Polymers, Inc. based in Akron, Ohio — is owned 60% by NPI, 35% by Mitsubishi Rayon and 5% by Marubeni, and starts functionin in July. A. Woll, vice-presider of NPI, will assume the presidency of the new firm. The ne plant adopts Mitsubishi Rayon' technology and will go into regu lar operation this August.

Mitsubishi Rayon is the secon Japanese firm to undertake AB business in the U.S., followin Daical Chemical Industries, Lt The American ABS-resin mark has been dominated by the "bi 3" — GE, Monsanto and Do Chemical — and Mitsubishi i tends to make inroads into th market with emphasis on hig grade products such as those f plating and those featuring a hig degree of noninflammability.

Production will start with co modity-type and plating-gra products for the time being a gradually extend to heat-resista weather-proof and noninflamm ble types and polymer alloys. major share of the base polyme involved will be supplied by loc suppliers but a small part w be imported from Japan.

NPI is an American plasti sales company in which Marube has a 50% stake and is said have substantial sales streng from the East to the Northwest the States. The ABS compou to be produced by the new fi will be supplied to U.S. mak of electrical-machinery and el tronics parts for the moment, in the future it is planned to s ply it to Japanese makers of and electrical-appliance parts.

Mitsubishi hopes the 10,0 t/y plant will be running at capacity in 2 ~ 3 years a wants to boost the capacity 30,000 t/y in the long term. T sales target has been set at $1 million for the initial year $14 million for the third year.

New Developments from Japan

EW MICROBE SEEN MPROVING ACRYLAMIDE RODUCTION

Nitto Chemical Industry Co. as discovered an enzyme-producing microbe capable of increasing the efficiency of a biological roduction method for acrylamide. The company claims that he new microorganism will serve o raise the production capacity f the company's own production acilities from 6, to 10,000 tons year without having to revamp hem.

It has established the above-mentioned process designed to roduce acrylamide using a microbial enzyme-applied bioreactor. A commercial plant (capacity: 4,000 t/y) based on the in-ouse-developed process was tarted up in the spring of 1985: he production capacity was scaled up to 6,000 tons a year in the pring of last year.

The new process is superior to he sulfuric-acid and copper-catalyst processes acrylamide at lower cost and calls for only limited space for installation of a process plant.

Acrylamide produced using the romising process is of high purity and has high-level activity. It s unique in that the product itself nd polyacrylamide produced herefrom dissolve in water.

Acrylamide will be in steady demand for use in macromolecular flocculants, paper-strengthening agents and oil-recovery gents.

The new organism is being est-used in the existing plant and will be employed on a commercial basis during this year. The company plans to examine the feasibility of exporting the biological process and inaugurating acrylamide operations overseas by itself or on a joint-venture basis.

ION-EXCHANGE POLYSTYRENE FIBER HELPS PRODUCE EXTRA-ULTRAPURE WATER

Toray Industries, Inc. — together with Tohoku University — has developed technology for producing extra-ultrapure water using modified ion-exchange polystyrene fiber which has been developed by the company itself. The company claims that the water produced using the new technology is suitable for manufacturing 4 16-MB semiconductor chips.

It has removed impurities from the said ion-exchange fiber and thus prevented it from polluting the target water. The fiber's specific resistance stands at 18.25.

Researchers at the company are endeavoring to pioneer ion-exchange resin-applied equipment for producing extra-ultrapure water.

Ion-exchange fiber-based equipment is generally believed to have the following advantages: (1) it is capable of producing ultrapure water whose quality can be maintained over a long period of time; (2) it facilities highspeed production of a large quantity of ultrapure water and (3) it is capable of efficiently removing ions, total organic carbon (TOC), germs, fine particles and pyrogens from raw-material water, thereby producing ultrapure water.

Ion-exchange polystyrene fiber has far wider surface area than existing synthetic resin and film. The fiber's ion-exchanging speed is 10 ~ 100 times faster than the latter's. The product has already been extensively used in various fields covering extra-ultrapure-water equipment, precoated filters for nuclear power plants, air treatment, solid acid/alkali catalysts and immobilization of physiologically active substances.

ENGINEERING PLASTIC WITH HIGHER STRENGTH, HEAT RESISTANCE BARED

Idemitsu Kosan Co. has developed, and begun sample shipments of a new engineering plastic featuring higher strength and heat resistance. The product is a crystalline thermoplastic resin — — polyether nitrile (development code: "ID300") — made from a monomer with a nitrile group and diol.

ID300 reinforced with glass fiber or carbon fiber has a heat distortion temperature of 330°C — higher than that of 300°C for PEEK which excels in heat resistance among thermoplastic engineering plastics. The new resin without fillers has strength of 2,100 kg/cm², far higher than the 1,300 kg/cm² for PEEK in the same state. Its molding temperature is also as low as 340 ~ 350°C.

Compared with existing engineering plastics, the company claims that the new resin is excellent in mechanical strength, heat resistance, non in-flammability, sliding properties and electrical characteristics, etc., and thus hopes it will find markets for use in electrical, electronics and machine parts as well as aircraft and space-craft parts.

It says the new product is attracting great attention and receiving many inquiries from Western businesses.

Properties of "ID300" Polyether Nitrile and PEEK

	ID300			PEEK		
	Without filler	Reinforced with glass fibre	Reinforced with carbon fibre	Without filler	Reinforced with glass fibre	Reinforced with carb fibre
Mechanical properties						
Tensile strength (kgf/cm2)	1,400	1,700	2,300	940	1,500	2,100
Compressive strength (Kgf/cm2)	2,100	—	—	1,300	—	—
Thermal properties						
Heat distortion temperature (18.6 kg; °C)	165	330	330	152	300	300
Melting point (°C)	340	—	—	334	—	—
Glass-transition temp. (°C)	145	—	—	143	—	—
Noninflammability						
Noninflammability (UL-94)	V-0	V-0	V-0	V-0	V-0	V-0
Oxygen index	42	46	—	35	—	—

JAPAN FIRM, ROCHE LINK ON CLINICAL TEST SYSTEM, R&D

Kyoto Dai-ichi Kagaku Co. and Hoffman-La Roche Inc. of Switzerland have tied up for a solid-phase clinical testing system and clinical reagents. Under the agreement concerned, the Japanese firm has granted Roche worldwide sales rights for its "SPOTCHEM" fully automated dry-chemistry system using multi-reagent strips and the two will cooperate on R&D for clinical reagents.

SPOTCHEM employs unique multi-type solid-phase reagent strips. Measurement is performed by simply setting just one reagent trip on the strip table and pushing the START button. It has a built-in automatic sampler and a 6-channel analyzer unit, enabling it to perform simultaneous measurements for up to 12 tests. It is virtually fully automated from sampling to data print-out.

This is the first product of its kind to be provided with an auto-sampler. It can measure about 100 samples per hour. It is priced at Y2.5 million and its joint sales in Japan by Kyoto Dai-Ichi and Roche have been targeted at 1,500 units per year with yearly sales abroad by Roche at 3,000.

Nippon Roche K.K., a Japanese subsidiary of Roche, co-operates with Kyoto Dai-Ichi for business in Japan. Its sales last year reached Y49.3 billion, 10% of which was held by clinical-reagent and medical instrument sales.

ANTI-ARTERIOSCLEROSIS AGENT HAS EXCELLENT EFFECT

Daiichi Seiyaku Co. has developed a new anti-arteriosclerosis agent by combining a protein and two kinds of phospholipid. The agent has a structure very similar to that of high-density lipoprotein (HDL) — a cholesterol carrier — and acts to effectively remove cholesterol stuck to blood vessel walls.

A development race has been energetically under way for efficient anti-arteriosclerosis agents in Japan and abroad, reflecting the ageing of the populations of advanced nations. The company intends to exploit markets for t agent and export its manufacturing technology for foreign businesses.

The agent is a combination apo A_1, a main ingredient of human lipo-protein, and two kinds of phospholipid. It takes fr cholesterol from vessel walls a carries it to the liver, and al serves to stimulate growth HDL which acts to dislodge fr cholesterol from vessel walls a is thus called "good serum lip protein.

Recently and HMG-CoA redu tase inhibitor has been attracti attention as an agent fundame tally preventing growth of chole terol but it has a problem in th it serves to reduce not only "bad low-density lipoprotein (LDL) b also "good" HDL. In contrast, t new agent has no effect on LD but acts to increase only HDL. is also likely to have far few side effects, the company repor

The company is now preparing to mass-produce an apo A_1 prote by means of gene modification reduce production costs.

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MARKET INFORMATION

Market continued to be tight

The situation in the Bombay emical market continued to be im despite calling off of the trans- rt strike. The movement of goods s just started. The position is likely improve in a day or two.

Due to delayed shipment the price of acrylamide shot up to Rs. 95. The shortage of ready goods resulted in a price hike in acetone of Rs. 23. However there was a slight fall in acetic anhydride. Titanium continued to be tight. Dyes section was normal with usual shortage of HOC intermediates.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on August 8, 1989)

DUSTRIAL CHEMICALS	Per Kg.
mmonium sulphate	2.50
mmonium phosphate (Mono)	14.50
mmonium phosphate (Di)	14.00
mmonium carbonate (Di)	17.00
mmonium bicarbonate	5.60
mmonium chloride	3.00
mmonium nitrate	6.00
senic white powder	24.00
rylamide (Resale)	95.00
rium carbonate	6.00
aching powder (33% Cl)	4.20
Borax (Granular)	15.00
Borax (Powder)	15.25
Boric acid (Tech)	28.00
Bisphenol-A	82.00
Butyl carbitol	110.00
Caustic soda (Flakes)	14.00
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	4.25
Calcium carbonate (Activated)	4.75
Cobalt oxide	280.00
Cresylic acid	52.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	47.00
Copper sulphate	24.00
Chromic acid	61.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
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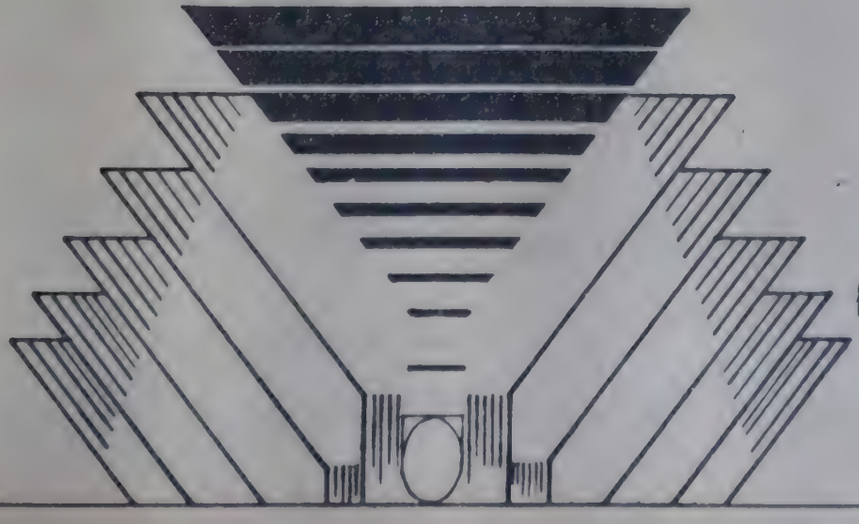

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Magnesium chloride (Crystal)	1.25+ST
Menthol crystal (Flakes)	900+Ex+ST
Menthol bold	665+Ex+ST
Menthol crystal cold	700+Ex+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	18.00
Maleic Anhydride (Resale)	39.00
Mercury (34.5 Kgs)	12,000.00
Nickel chloride	110.00
Oxalic acid (Resale)	22.00
Peppermint oil (Rectified)	195+Ex+ST
Potassium carbonate (Indian)	30.00
Potassium carbonate (Imported)	32.00
Potassium bichromate	32.50+ST
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	115.00
Polyvinyl alcohol (No. 173)	120.00
Polyvinyl alcohol (No. 208)	150.00
Paraformaldehyde (Resale)	23+ST
Phthalic anhydride 36% (Resale)	25.50
Pentaerythritol (Resale)	45.00
Paraffin wax	20+ST
Rangolite (German)	80+ST
Rangolite (Czech.)	61+ST
Sodium sulphate (Fine)	6.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	20.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	680.00
Sodium chlorite 80% (Spain)	88.00
Soda Ash (Tata)	5.00
Soda Ash (Birla)	4.50
Soda Ash (Imp.)	4.50
Sodium bicarbonate	7.50
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	5.00
Sodium alginate	250+ST
Titanium Dioxide (Anatase)	130+ST
Titanium Dioxide (Rutile – RCR_2)	150.00
Tartaric acid	100.00
Trisodium phosphate	5.50
Thiourea	80.00
Urea (Tech.)	2.90
Vacuum salt	1.00
Zinc Dust	32.00
Zinc Oxide	52.00
Zinc chloride powder (Tech.)	12.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.50
Acetic Anhydride (Resale)	29.00
Acetone (Resale)	23.00
Adipic Acid	57.00
Aceto Acetanilide	55.00
Aniline Oil	68.00
Benzoate Plasticiser	62.00
Butyl acrylate	78+ST
Butyl stearate	50.00
Butanol	
Benzyl Alcohol	
Benzyl Chloride	
Benzo trichloride	
Benzoyl chloride	
Bromine Liquid	
Chloroform	
Carbon Tetrachloride	
Cellosolve	
Cyclohexanone	
Cyclohexanol	
Diacetone (Resale)	
Diethyl Oxalate	
Diethyl glycol (DEG)	
Dioctyl Phthalate	
Diallyl Phthalate	
Dimethyl Phthalate	
Dioctyl Adipate	
Dibutyl Adipate	
Dipentene	
Dimethylamine 40%	
Dimethylamine 50%	
Ethyl Acetate	
Ethyl Acrylate	
Ethylene Dichloride	
Ethylene Glycol	
Formic Acid (Imp.)	
Formaldehyde (Resale)	
Glycerine (CP)	
Glycerine (IW)	
Hydrogen Peroxide 50% (Resale)	
Isopropyl Alcohol	
Isobutyl Alcohol (Resale)	
Monoethanolamine (Resale)	
Melamine	
Methyl Ethyl Ketone	
Methyl Isobutyl Ketone	
Methyl Acrylate	
Methyl Dichloride (Resale)	

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Carbitol	68+ST
Meta Cresol	60.00
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Ortho Cresol	30+ST
Phenol (Resale)	37.00
Propylene Glycol	55.00
Polyethylene Glycol (No.200)	52.00
Polyethylene Glycol (No.400)	53.00
Polyethylene Glycol (No.500)	42.00
Polyethylene Glycol (No.1600)	14.00
Polyethylene Glycol (No.4000)	70.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	110.00
Styrene Monomer	36.00
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	29.00
Triethanolamine (Resale)	65.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	47.50

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	12.00
Methanol	13.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	21.00
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DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)	
Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	190.00
Aceto Acetic Ester (Methyl)	66.00
Ammonium Molybdate	215.00
Anthraquinone	130.00
Anthranilic Acid	75.00
2-Amino 4-Nitrophenol	150.00
Blue B. Base (Local)	255.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	98.00
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Coach Acid	55.00
C. Acid (Imp.)	165.00
Cyanuric Chloride	135.00
2,4- DNCB	31.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	70.00
Diethyl Aniline	185.00
Diamino stilbene disulphonic acid	165.00
3,3-DCB (Imp.)	175.00
Gamma Acid (Atul)	200.00
H. Acid (Atul)	110.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	330.00
J. Acid Urea	400.00
K. Acid	127.00
MPDS (German)	190.00
MNA	125
Meta Ureido Aniline	235
MPD (Local)	215
MPD (Japan)	250
Naphthenic Acid	40
N-Methyl J. Acid	540
N-Methyl Aniline	130
Naphthalene (Refined)	21
Ortho Anisidine (OA) (Imp.)	105
Ortho Dichloro Benzene (ODCB)	16
OT Base	117
Para Dichloro Benzene (PDCB)	27
Para Anisidine (PA local)	150
PNA	105
Para Cresidine (Imp.)	400
Para Amino Azo Benzene (India)	190
PNCB	49
Para Amino Acetanilide	170
1-Phenyl 3-Methyl 5-Pyrazolone	150
Phenyl J. Acid	375
Para Amino Benzoic Acid	135
PT Base	165
Rhoduline Acid	530
Resist Salt 80%	34
Resorcinol	190
Sodium Naphthionate	67
5-Sulpho-Anthranilic Acid	82
Sulphanilic Acid	52
Sulpho Tobias Acid	165
Trichloro Benzene (TCB)	22
Tobias Acid	170
Metanilic Acid	48
MTD	114

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Bombay Dyes Market

(Prices as on August 8, 1989)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60
Red 2B	42
Red FB	42
Red Violet FBL	67
Orange 3R	2
Violet 3R	3
Violet RL	3
Violet 6R	6
Scarlet RR	2
Rubine 3B	2
Rubine CB	4
Blue GL	4
Blue BGF	8
Navy Blue RE	3
Brown 3REL	2
Black GEL	4
Dark Brown 3B	4

BASE COLOURS	P
Fast Yellow GC	
Fast Orange GC	
Fast Scarlet R	
Fast Scarlet RC	
Fast Scarlet RCR	
Fast Scarlet G	
Fast Scarlet GN	
Fast Scarlet GG	
Fast Scarlet GGS	
Fast Red B	
Fast Red RC	
Fast Red R Flakes	
Fast Red TR	
Fast Red TR Oil	
Fast Red RL	
Fast Red KB Oil	
Fast Bordeaux GP	
Fast Garnet GBC	
Fast Violet B	
Fast Blue BB	

NAPHTHOL COLOURS
ASG
AS
ASSW
ASBS
ASBO
ASD
ASOL

TR	369.00
PH	336.05
E	236.00
EL	249.95
LB	2002.35
BT	2459.45
WG	143.00
SG	538.65
SR	652.60

ROCION COLOURS	Per Kg.
olden Yellow HR	207.95
rill Yellow H4G	145.65
upra Yellow H-8GP	168.55
rill. Yellow HE6G	214.75
ellow G-E4R	276.05
rill. Yellow H7G	332.30
ellow M4R	275.45
ellow MGR	387.65
rill. Yellow M4G	201.15
rill. Yellow M8G	366.10
ellow M3R	244.70
rill. Orange H2R	303.80
rill. Red H7B	157.95
rill. Orange M2R	313.15
rill. Red H8B	213.55
rill. Scarlet H RN	245.05
upra Red H-3BP	179.80
rill. Red H-F3B	243.45
rill. Magenta HB	182.00
rill. Red M 5B	160.05
rill. Red M 8B	218.35
rill. Pink MB	137.10
rill. Magenta MB	163.65
rill. Purple H-3R	219.55
rill. Purple H-7R	175.40
Navy Blue H 3R	333.75
Brill. Blue H-GR	406.40
Brill. Blue H5G	207.95
Blue H 5RX	286.20
Brill. Blue H 7G	213.95
Brill. Blue H 7RX	358.15
Turquoise HA	265.05
Supra Blue H-3RP	595.30
Supra Turquoise H 2G P	181.50
Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818 60
Gold Orange 3G Pdr. Fine	1158 45
Brill. Orange 6R Pdr. Fine	624 35
Gold Orange 3G Supra Disp	693 85
Brill. Orange 6RX Powder	394 30
Brill. Red 3B Pdr. Fine	1214 15
Brill. Red 3B Supra Disp	867 45
Brill. Purple 3R Acra Powder	827 05
Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.00
Jade Green 2G Ptg. Paste	125.50
Jade Green XBN Ptg. Paste	128.00
Jade Green 2G Supra Disp.	61.00
Olive D Pdr. Fine	56.00
Olive Green B Supra Disp.	47.00
Jade Green XBN Supra Disp. (N)	354.00
Olive OMW Powder Fine	12.00
Olive OMW Supra Disp.	7.00
Olive D Supra Disp.	18.75
Olive R Supra Disp.	35.50
Olive D. Ptg. Paste	44.00
Olive Green B Ptg. Paste	17.00
Olive Green B Acra Conc.	50.00
Olive R Acra Conc.	23.00
Brown R Pdr. Fine	28.00
Dark Brown 3R Fine	29.50
Brown G Supra Disp.	47.00
Brown 2G Supra Disp.	17.00
Brown R Supra Disp.	50.00
Brown BR Powder	50 00
Dark Brown 3R Ptg. Paste	21.00
Dark Brown 3R Supra Disp	32.00
Brown G Acra Conc.	12.00
Brown M. Powder Fine	22.50
Grey M. Supra Disp.	42.00
Blue BC Acra Conc. P	39.50
Direct Black AC Supra	38.00
Direct Black AC Pdr.	15.00
Direct Black CH Sup	60.00
Direct ACD Ptg. Pa	24.50
	27.00
	16.50
	22.00
	20.00

Delhi Market

DELHI: AUGUST 4, (NNS) Despite satsifactory supply position, prices of potassium permanganate powder recorded a marked decline of Rs. 1,000 at Rs. 2,800 per 50 kg due to lack of buying support. Potassium permanganate crystal also declined to Rs. 3,200 from Rs. 4,200 in the local chemical market. Titanium dioxide anatase and RC-822 showed a rising tendency in the beginning of the week and prices moved up by Rs. 4/5 at Rs. 128 and Rs. 158 but later on at the week-end on arrival of fresh stock it again suffered a loss of Rs. 7/8 at Rs. 121 and Rs. 150 per kg respectively. K. Brand titanium which was sold at Rs. 110 in the beginning of the week drifted lower later by Rs. 2 at Rs. 108 per kg. RCR-2 titanium was also being quoted at Rs. 150 instead of Rs. 155 per kg. It was due to mutual trading by the stockists in the expectation of fresh arrivals from Kerala.

As a result of poor supply position from Sambhal, Moradabad, Chandausi, and Amroha areas of U.P. coupled with offtake of 80 tonnes by the exporters, Menthol bold registered a rise of Rs. 10 at Rs. 350 per kg. Supply was also reported from Pakistan. Later on improved supply from U.P. coupled with decline in demand from the exporters, its prices again suffered a loss of Rs. 10 at Rs. 340 and moved to the previous level. Menthol flake moved to Rs. 257 from Rs. 247 but at the end of the week it settled at Rs. 255. Medium grade menthol also rose to Rs. 315 from Rs. 310 but again reverted to its previous level of Rs. 310.

July delivery menthol flake was quoted at Rs. 258/kg. For August delivery deals were struck at Rs. 267 in the beginning but at the week-end it was quoted at Rs. 262. Menthol oil Shivalik and MS one opened at Rs. 185/195 rose to Rs. 197/208 and ultimately settled at Rs. 190 and Rs. 200. DMO moved up by Rs. 10 to Rs. 110.

In the wake of enhancement in truck fare as a result of reduction in loading quantity, prices of most of the commodities are showing a rising tendency. Ammonia bicarb improved by Rs. 5 at Rs. 155 per 25 kg on good demand from Calcutta. Soda ash jumped up by Rs. 5/10 at Rs. 340/350 per bag due to poor arrival. Following poor arrival from Maharashtra and the South coupled with good offtake, caustic soda flakes flared up to Rs. 600 per 50 kg from Rs. 580/585. Sodium nitrate advanced by Rs. 10 at Rs. 425. Rangolite Germany spurted by Re. 1 due to decline in import.

(DELHI MARKET RATES AS ON AUGUST 4, 1989)

Ammonia Bicarb (Per 25 Kg.)	155.00
Mercury (Per flask)	11,600.00
Soda ash (Per bag)	340/350.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	600.00
Citric acid (Per 50 Kg.)	2,160/2,500.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	100.00
Stable Bleaching Powder KCI (Per 25 Kg.)	95.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	98.00
Sodium Bicarbonate (50 Kg.)	290/300.00
Sodium Hydrosulphite (Per Kg.)	34.50/37.50
Rangolite (Per Kg.)	63.00/77.00
Boric acid Technical (Per 50 Kg.)	1,400.00
Paraffin Wax (Per 50 Kg.)	840.00
Tartaric Acid (Per 50 Kg.)	10,750.00
Borax Granular (Per 50 Kg.)	700.00
Borax Crystal (Per 50 Kg.)	705.00
Sodium Nitrite (Per 50 Kg.)	700/760.00
Sodium Nitrate (Per 50 Kg.)	425.00
Camphor Thal (Per Kg.)	116.00
Camphor Powder (Per Kg.)	106.00
Menthol Bold (Per Kg.)	340.00
Menthol Medium (Per Kg.)	310.00
Menthol Flake (Per Kg.)	255.00
Glycerine (Per Kg.)	55/58.00
Sodium Silicate (Per quintal)	250/300.00
Hexamine (Per Kg.)	30.50
Acetic Acid Glacial (Per Kg.)	14.50
Copper Sulphate (Per quintal)	2,350/2,700
Formic Acid (Per Kg.)	25.00
Formaldehyde (Per Kg.)	8.50
Hydrogen Peroxide (Per Kg.)	27.50
Calcium Carbonate (Per Tonne)	2,500/4,000
Acid Slurry Soft (Per Kg.)	24.00
Acid Slurry Hard (Per Kg.)	34.00
Phosphoric Acid (Per 50 Kg.)	1,050.00
Potassium Nitrate (Per quintal)	900/1,200.00
Potassium Permanganate (Per 50 Kg.)	2,800/3,200.00
Sodium Bichromate (Per 50 Kg.)	1,575/1,600.00
Trisodium Phosphate (50 Kg.)	525.00
Titanium Dioxide Anatase (Per Kg.)	121.00
Titanium Dioxide RC-822 (Per Kg.)	150.00
Zinc Oxide (Per metric tonne)	42,000/52,000.00
Phenol Carbolic Acid (Per Kg.)	37.00
Carbon Tetrachloride (Per Kg.)	24.00
Chloroform (Per Kg.)	28.00
Sodium Sulphate (Per metric tonne)	3,200/3,500.00
Naphthalene Balls (Per 50 Kg.)	1,325.00

DYES & COLOURS	(Per K
Naphthol AS	175/201
Naphthol ASG	180/295
Naphthol ASBS	210/248
Naphthol ASTR	265/360
Naphthol ASOL	210/238
Naphthol ASBO	195/260

DIRECT DYES	(Per K
Black E. Conc.	110/176
Diazo Black B.T.	105/147
Green B	90/140
Blue 2-B	60/101
Blue 2-B 225% (JNR)	125
Sky Blue FB	160/235
Basic Auramine	55/110
Basic Rhodamine	325/425
Basic Methylene Blue	100/184
Basic Violet	150/18
Basic Malachite Green	150/16
Acid Orange	55/11
Congo Red H/C	75/12

Madras Market

Dull to moderate conditions prevailed in the Madras chemical market. There was no let up in the prices of caustic soda flakes which continued to rule at Rs. 12,800 per MT. The alkali manufacturers have announced their new prices for caustic soda lye at Rs. 8,000 per MT effective August 89. Arrivals from Maharashtra & Gujarat regions have been seriously affected by the transport strike which has entered the second week now

Among solvents IPA and MIBK were in demand and supplies are not coming from the manufacturers due to transport problems. Methanol production was also affected due to floods in Maharashtra but though the situation has improved supplies continue to be affected.

(MADRAS MARKET RATES AS ON AUGUST 5, 1989)

Acetic Acid Glacial (per kg)	16.00
Aluminium Sulphate Iron free (per MT)	4,000.00
Ammonium Bicarbonate (per 25 kgs)	175.00
Ammonium Chloride (per MT)	3,000.00
Acid Slurry (per kg)	28.00
Barium Carbonate (per kg)	6.00
Barium Chloride (per kg)	5.50
Boric Acid Technical (per kg)	28.00
Bleaching Powder (per 50 kgs)	235.00
Borax (per 50 kgs)	700.00
Caustic Soda Flakes – Mettur Chemicals (per MT)	12,800.00
Caustic Soda Flakes – Andhra Sugars (per MT)	12,800.00
Calcium Chloride 70% Solid (per MT)	3,000.00
Calcium Chloride Anhydrous (per MT)	5,500.00
Calcium Carbonate (Activated) (per MT)	6,900.00
Calcium Carbonate (Precipitated) (per MT)	5,000.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	120.00
Pure Para Cresol 96% (per kg)	80.00
Meta Para Cresol 42% (per kg)	47.00
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine (per kg)	52.00
Hydrosulphite of Soda (TCPL) (per kg)	40.00
Hydrosulphite of Soda (IDI) (per kg)	43.00
Hydrosulphite of Soda (BASF) (per kg)	43.00
Hexamine (per kg)	30.00
Hyflo Supercell (per kg)	20.00
Hydrogen Peroxide (per kg)	29.50
Litharge (per kg)	40.00
Lead Acetate (per kg)	42.00
Magnesium Carbonate (per kg)	19.50
Magnesium Chloride (per kg)	3.50
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	300.00
Oxalic Acid (per kg)	24.00
Paraffin Wax (per kg)	24.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	23.00
Polyvinyl Alcohol powder (per kg)	125.00
Pentaerythritol (per kg)	52.00
Phthalic Anhydride (per kg)	29.00
Soda Ash (TAC) (per 75 kgs)	385.00
Soda Ash (TATA) (per 75 kgs)	385.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,000.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	14.00
Sodium Sulphide Flakes (per kg)	13.00
Sodium Bisulphite (per kg)	5.00
Sodium Alginate (per kg)	220.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	3.00
Titanium Dioxide (Anatase) (per kg)	130.00
Titanium Dioxide (Rutile) (per kg)	150.00
Trisodium Phosphate (per kg)	7.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	54.00
Zinc Chloride Powder (per kg)	12.00
Zinc Sulphate (per kg)	7.00

SOLVENTS

Acetone -- HOCL (per kg)	18.75
Butanol (per kg)	35.50
Butyl Acetate (per kg)	44.00
Benzene (per lit)	17.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	23.00
Chloroform (per kg)	28.00
Diacetone Alcohol (per kg)	29.50
Diethylene Glycol (per kg)	47.00
Dichloroethane (per kg)	17.00
Di-octyl Phthalate (per kg)	50.00
Di-N-butyl Phthalate (per kg)	50.00
Ethyl Acetate (per kg)	21.00
Isopropyl Alcohol (per kg)	32.00
Methanol (per kg)	12.00
Methylene Chloride (per kg)	22.50
Methyl Ethyl Ketone (per kg)	42.00
Methyl Isobutyl Ketone (per kg)	39.50
Phenol (per kg)	38.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	60.00
Trichloroethylene (per kg)	24.50
1-1-1 Trichloroethane (per kg)	27.00
Turpentine (per lit)	16.50
Toluene (per lit)	22.00
Xylene (per lit)	20.00

International Bulk Chemical Prices

Spot Prices are as on July 26, 1989

Naphtha prices further slipped to S155-157/ton cif NWE. Ethylene prices slipped to S300-310/ton cif NWE. There was little change in the propylene market with demand from PP and other derivatives slowing down. Tight supplies put upward pressure on butadiene prices with numbers moving to $360-370 fob. Benzene prices slipped to S270-275/ton fob NWE, with little demand from downstream users. Toluene is facing downward price pressure from a sliding gasoline market. Toluene prices are down to S230-235/ton fob NWE with prices expected to fall still lower.

Paraxylene prices have firmed to S620-625/ton fob NWE following enquiries for material. Orthoxylene has recovered some ground to S305-315 fob NWE. Xylene prices seemed st at S300-305/ton fob Rotterdam for vent and S305-310/ton fob Rotter for virgin. Styrene has slipped S600-605/ton cif NWE for T1 mat following high stocks. Methanol pr continued to slide with T2 dow DM215-220/ton fob NWE and T1 duce to S95-100/ton cif NWE.

Product	European Spot price range $/ton	US price range $/ton
Ethylene	300-310 (cif)	n.a.
Propylene (100% basis)	382-408 (cif)	n.a.
Butadiene	360-370 (fob)	396-418 (spot)
Benzene	270-275 (fob)	285-288 (spot)
Toluene	230-235 (fob)	243-258 (spot)
Xylenes (virgin)	305-310 (fob)	262-265 (spot)
(solvent)	300-305 (fob)	n.a.
Styrene	630-640 (T2)(fob) 600-605 (T1) (cif)	551-595 (spot)
Paraxylene	620-625 (fob)	n.a.
Orthoxylene	305-315 (fob)	n.a.
Ammonia	98-102 (c&f)	(fob)
Methanol	115-120 (T2)(fob) 95-100(T1)(cif)	158-160 (fob)
Naphtha	155-157 (cif)	n.a.

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Apl sailir (5)
15/8	Drvar (Yug)	Oceanic	P. Said, Rijeka.	2
16/8	Seacrest Pioneer (Voy-016)	Choice	Leghorn; Marseilles; Valencia; Genoa; Cadiz; Barcelona; Ravenna; Venice; Naples; Trieste; La Spezia and other inland destinations. (Carting at 19-ID).	2
10/8	Arab Mazin	Depe	Aden; Jeddah.	2
Stream	Pazin	Oceanic	Jeddah; Aqaba; Rijeka.	2
15/8	CMB Energy	C.M.B.	Djibouti; Port Sudan; Jeddah; La Spezia; Valencia; Genoa; Barcelona;	1
21/8	CMB Merit (Nava Sheva)		Marseilles; Tunis; Casablanca; Tangier; Alexandria; Piraeus; Mersin; Limassol; Felixstowe; London; Liverpool; Manchester; Birmingham; Avonmouth; Dublin and all inland destinations in U.K.; Antwerp; Rotterdam; Hamburg; Bremen; Leixoes; Lisbon; Copenhagen; Oslo; Gothenburg; Stockholm; Malmao; Aarhus; Helsinki. (Carting at CFS).	2
20/8	Tibor Szamuely (Rus) (V-101 W/B)	Transocean	Odessa; Izmail; Reni (USSR); Russe; Bulgaria; Budapest (Hungary); Linz; Vienna (Austria); Bratislava (Czechoslovakia); Deggendorf; Regenberg (West Germany) (All ports on River Danube). (Carting at N/O-PD & G-PD).	2

(2)	(3)	(4)	(5)
Al Riyadh	Sitara	Karachi (Afghanistan)	20/8
Mercs Maho	Mackintosh	Karachi	19/8
M. Vladimirskiy	Transocean	Kobe; Yokohama.	19/8
Capt. Ali (UAE)	Ashapura	Dammam; Abu Dhabi; Al Jubail	17/8
Seacrest Pioneer (V-016)	Parekh/ Choice	Muscat; Dubai; Sharjah; Abu Dhabi; Bahrain; Dammam; Kuwait; Baghdad. (Carting at Hay Bunder No. 4). Dubai; Dammam; Kuwait; Muscat; Bahrain; Abu Dhabi. (Crtg. 19-ID).	20/8
CMB Energy (Nhava Sheva)	C.M.B.	Dubai; Abu Dhabi; Bahrain; Kuwait; Dammam; Doha. (Carting at CFS).	17/8
Vishva Nandini (Ind)	S.C.I.	Seychelles; P. Louis; Tamatave; Mombasa; Dar Es Salaam; Beira & inland destinations in E. Africa. (Carting at Timber Pond No. 1).	23/8
CMB Merit (Nhava Sheva)	C.M.B.	Dar Es Salaam; Mombasa (Direct); Nacala; Tanga; Kampala; Blantyre; Lusaka; Noola; Matwara; Llongwe and all inland destinations in East Africa. (Carting at CFS).	21/8
CMB Energy/ CMB Merit (Nhava Sheva)	C.M.B.	Norfolk; New York; Baltimore; Philadelphia; Charleston; Savannah; Houston; Miami; New Orleans; Via Antwerp; Montreal; Toronto; Halifax. (Carting at CFS).	17/8 21/8
Seacrest Pioneer (V-016)	Choice	New York; Baltimore; Norfolk; Savannah; Montreal; Toronto; Charleston; Houston; New Orleans; Miami; Tampa; Chicago and other inland destinations. (Carting at 19-ID).	20/8
CMB Energy/ CMB Merit (Nhava Sheva)	C.M.B.	Lagos; Abidjan; Lome; Dauala; Matadi; Port Gentil; Pointe Noire; Nouakchott; Cotonou; Dakar; Luanda; Monrovia; Tema via Antwerp. (Carting at CFS).	17/8 21/8

VESSELS DUE IN BOMBAY FOR IMPORT DISCHARGE

e Date	Steamer's Name	Agents	From
8	Arunachal Pradesh	S.C.I.	U.S./Canada
8	Chandidas	S.C.I.	U.K. Cont./U.S.
8	Mount Fuji	Sai Ship	Mexico
8	Mizoram	S.C.I.	Japan/Far East
8	Tibor Szamuely (Voy-101)	Transocean	Russia/E. Europe

Raw Materials Available with Modvat Benefits From Ready Stock/Incoming Consignments

ACRYLAMIDE
ACRYLIC ACID
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BISPHENOL-A
BORAX
BORIC ACID POWDER
BROMINE LIQUID
BUTYL CELLOSOLVE
CARBITOL
CELLOSOLVE
CYCLOHEXANONE
D M F
EPICHLOROHYDRINE
HYDROQUINONE
HYFLOSUPERCELL
ISOPHORONE
TRICHLOROETHYLENE
OCTOIC ACID
PARAFORMALDEHYDE
PERCHLOROETHYLENE
POTASSIUM FERRO-CYANIDE
PROPIONIC ACID
PROPYLENE GLYCOL
STYRENE MONOMER

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Lithium Hydroxide
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f. Epikote 828 or equivalent
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Materials Imported

BOMBAY
(From 19.4.89 to 27.4.89)

CETOACET MONOMETHYL-DE: From Japan: National Organic mical Inds., 16 MTs., Rs. 4,18,528.

CETYL ACETATE: From FRG: an Drugs & Pharmaceuticals Ltd., 60 Kgs., Rs. 5,45,883.

CETYLENE BLACK: From Sin-ore: Lakhanpal National Ltd., 36,000 ., Rs. 10,19,695.

CRYLAMIDE: From Japan: ghi Textile Processors Pvt. Ltd., 40 Kgs., Rs. 1,26,896; Superchem dia), 1,020 Kgs., Rs. 25,681; Synth em Industries, 18,540 Kgs., 4,04,985; Texspan, 1,020 Kgs., 25,528.

ALDEHYDE C-12: From USA: C. Davar Aromatics Pvt. Ltd., 2,497 s., Rs. 7,85,860.

ALDRIN TECH.: From Netherlands: yatri Pestichem Manufacturing mpany Pvt. Ltd., 11,022 Kgs., . 12,92,254.

ALPHA NAPHTHOL: From Neth-lands: Amritlal Chemaux Limited, 00 Kgs., Rs. 1,40,051; From USA: co Products Ltd., 2,040 Kgs., s. 1,56,977.

ALPHA PICOLINE: From FRG: rlabs Ltd., 12,950 Kgs., Rs. 5,60,400.

AMIDOTRIAZ ACID: From FRG: erman Remedies Limited, 3,060 Kgs., s. 21,97,876.

AMINO ANISIC ACID ANILIDE: rom Japan: PDL Chemicals Ltd., 200 Kgs., Rs. 85,999.

2-AMINO-3-BROMO-5-NITRO-ENZO NITRILE: From Japan: andoz (I) Ltd., 1,950 Kgs., s. 7,25,525.

ANILINE OIL: From Hungary: Bayer India Ltd., 58,800 Kgs., Rs. 14,80,447.

AROMATIC CHEMICALS: From FRG: Kanta Chemical Co., 60 Kgs., Rs. 41,288; From Japan: Seth Brothers (Perfumers) Pvt. Ltd., 60 Kgs., Rs. 66,092; From Netherlands: Hindustan Lever Ltd., 750 Kgs., Rs. 3,01,525; From Switzerland: Hindustan Lever Ltd., 4,000 Kgs., Rs. 12,36,730.

BENZALDEHYDE: From Japan: R. Sureshchandra & Co., 3,800 Kgs., Rs. 98,067; From USA: Arlabs Ltd., 16,800 Kgs., Rs. 4,30,916; Boehringer Knoll Limited, 16,800 Kgs., Rs. 4,30,916.

BENZENE TETRA CARBON ACID: From FRG: Hardcastle & Waud Mfg. Co. Ltd., 500 Kgs., Rs. 1,21,295.

BETA PICOLINE 95.5%: From USA: Kwizol Chem Pvt. Ltd., 7.141 MTs., Rs. 2,71,938; Lasons Engg. Co. Pvt. Ltd., 4,825 Kgs., Rs. 1,76,149.

BON ACID: From Japan: Dalal Enterprises, 2,000 Kgs., Rs. 2,20,305.

BUTACHLOR TECH. 92% MIN.: From USA: BL Industries, 34,920 Lbs., Rs. 7,41,828; Gujarat Agro Inds. Corpn. 34,920 Lbs., Rs. 7,14,353; Northern Minerals Ltd., 15,840 Kgs., Rs. 7,41,828.

BUTYL ACRYLATE: From FRG: BASF India Ltd., 2,880 Kgs., Rs. 78,403; From Japan: BASF India Ltd., 14,400 Kgs., Rs. 4,26,006.

1,3 BUTYLENE GLYCOL: From Japan: Indofil Chemicals Co., 16,000 Kgs., Rs. 4,29,994.

BUTYNE DIOL: From UK: Canning Mitra Phoenix Ltd., 5 Nos., Rs. 1,00,339.

CALCIUM SILICIDE: From Brazil: Greaves Foseco Ltd., 1,000 Kgs., Rs. 27,538; From France: Tata Engineering & Locomotive, 2,000 Kgs., Rs. 50,561.

CARBAZOLE 95-97%: From FRG: PDI Chemicals Pvt. Ltd., 4,000 Kgs., Rs. 2,18,246.

CARBOFURAN TECH. 75%: From Italy: All India Medical Corpn., 4,950 Kgs., Rs. 8,50,596.

CARBON ACTIVATED: From Japan: Shriram Vinyl & Chem Inds., 8,010 Kgs., Rs. 4,77,190.

CARBON BLACK: From FRG: Pepega Insulation & Packaging, 1,400 Kgs., Rs. 49,945; From Mexico: Bombay Tyre Intl. Ltd., 1,08,864 Kgs., Rs. 12,16,293.

CHLORPROMAZINE HCl: From China: Micro Labs Pvt. Ltd., 500 Kgs., Rs. 3,54,378; From USSR: Sun Pharmaceutical Inds., 96 Kgs., Rs. 58,516.

CITRIC ACID: From China: Jayant Oil Mills, 16,500 Kgs., Rs. 2,85,609; Zenith Limited, 17.5 MTs., Rs. 2,93,409.

2-CYANO-4-NITRO ANILINE 96%: From China: M.S. Shah, 1,000 Kgs., Rs. 1,68,376.

2-CYANO PYRAZINE: From Japan: Indo Pharma Pharmaceutical Works, 600 Kgs., Rs. 3,54,744.

CYANOPYRIDINE: From Japan: Fine Organics, 3.550 MTs., Rs. 2,46,356.

3-CYANOPYRIDINE: From USA: Veer Chemie & Aromatics Pvt. Ltd., 4,000 Kgs., Rs. 2,93,320.

CYANURIC CHLORIDE: From FRG: Monarch Dyestuffs Inds., 7,650 Kgs., Rs. 3,53,181; From FRG: Prafull and Brothers, 8,150 Kgs., Rs. 3,62,582; Southern Sea Foods Pvt. Ltd., 9 MTs., Rs. 4,15,506.

D(-)ALPHA PHENYLGLYCINE CHLORIDE HYDROCHLORIDE: From Italy: Scanomax India Ltd., 1,015 Kgs., Rs. 3,58,188; From Spain: Alembic Chemical Works Co. Ltd., 315 Kgs., Rs. 1,13,055.

D-PARA HYDROXY PHENYL GLYCINE METHYL POTASSIUM DANE SALT: Gujarat Lyka Organics Ltd., 1,000 Kgs., Rs. 3,30,457.

DL-2-AMINO 1-BUTANOL: From

FRG: Cadila Laboratories Ltd., 10,140 Kgs., Rs. 13,48,635; Themis Chemicals Ltd., 10,140 Kgs., Rs. 13,96,180.

DL-METHIONINE (FEED GRADE): From France: Godrej Soaps Ltd., 2,000 Kgs., Rs. 97,563.

DESMODUR N: From FRG: Goodlass Nerolac Paints Ltd., 1,020 Kgs., Rs. 1,05,740.

DESMODUR: From FRG: Kayger Foam Pvt. Ltd., 6,250 Kgs., Rs. 3,09,018.

DIALLYL PHTHALATE: From USA: Dr. Beck & Co. India Ltd., 480 Kgs., Rs. 34,852.

DICHLONE: From Japan: Alchemic Dyechem Pvt. Ltd., 2,000 Kgs., Rs. 3,20,107.

DICHLORO ACETYL CHLORIDE: From FRG: Nitson Laboratories, 5,000 Kgs., Rs. 1,88,867; From Japan: Nitson Laboratories, 5,000 Kgs., Rs. 1,74,386.

3-4 DICHLORO NITRO BENZENE: From FRG: Sudarshan Chemical Inds. Ltd., 7,000 Kgs., Rs. 3,29,048.

2,4 DICHLORO TOLUENE: From Japan: Seshadri Nihalani & Menon Chem, 1,000 Kgs., Rs. 1,09,962.

DICYANDIAMIDE: From Norway: Sultanchand & Bhimalprakash, 18 MTs., Rs. 4,75,658.

2,6 DIETHYL ANILINE: From Switzerland: Sudarshan Chemical Inds. Ltd., 14,820 Kgs., Rs. 6,64,643.

DIETHYL SULPHATE: From Japan: Ahmedabad Chemicals Pvt. Ltd., 15,640 Kgs., Rs. 3,31,888; Ind. Expo Trading Co., 14,720 Kgs., Rs. 3,28,783.

DI ISODODECYL PHTHALATE: From FRG: Finolex Cables Ltd., 31.512 MTs., Rs. 5,15,803.

DIMER ACID: From Netherlands: Noble Synthetics Ltd., 15,200 Kgs., Rs. 3,10,944.

DIMETHYL ACETAMIDE: From FRG: Garware Plastics & Polyeste 12,350 Kgs., Rs. 3,21,368; J.K. Synthe tics Ltd., 74,100 Kgs., Rs. 16,17,20

2,3 DIMETHYL BUTANE: Fro Denmark: Danfoss (I) Ltd., 2 Nos Rs. 12,858.

DIMETHYL DICHLORO SILANE From FRG: Nikhil Drugs Chemica Pvt. Ltd., 1,000 Kgs., Rs. 40,711; Fro FRG: Reliance Silicones (I) Pvt. Ltd 14,800 Kgs., Rs. 2,95,120.

DIMETHYL FORMAMIDE: Fro Japan: Parke Davis India Ltd., 5,13 Kgs., Rs. 1,00,907.

DIMETHYL OCTANOL: From UK The Tata Oil Mills Co. Ltd., 2,667.1 Kgs., Rs. 3,42,474.

DIMETHYL SULFOXIDE: Fro USA: Arvind Dye Chem, 3,855.4 Kgs., Rs. 92,551.

1,3 DIMETHYL UREA: From FRG Pefco Industries Ltd., 11,250 Kgs Rs. 2,26,599.

DI-N-BUTYL TIN DICHLORIDE From FRG: Gandhi Parekh Investment Corpn., 4,000 Kgs., Rs. 4,75,104.

DIOCTYL PHTHALATE: Fro Thailand: Shah Chhaganlal Laxmi hand, 96,000 Kgs., Rs. 12,06,527.

DIPHENYL OXIDE: From China DWD Pharmaceuticals, 2,800 Kgs Rs. 61,883; From USA: Indian Dyestu Inds., 10,450 Lbs., Rs. 1,21,379.

EPICHLOROHYDRINE: Fro Japan: Cibatul Ltd., 95,040 Kgs Rs. 26,17,218.

ETHOXY METHYLENE MALO NIC ACID ESTER: From France Ranbaxy Laboratories Ltd., 8,100 Kgs Rs. 15,30,912.; From FRG: Lakm Ltd., 5,800 Kgs., Rs. 11,86,497.

ETHYL GLYCOL: From USA Asian Paints India Ltd., 18,000 Kgs Rs. 3,65,849.

ETHYL GLYCOL ACETATE From USA: Asian Paints India Ltd 18,800 Kgs., Rs. 4,28,298.

CHEMO

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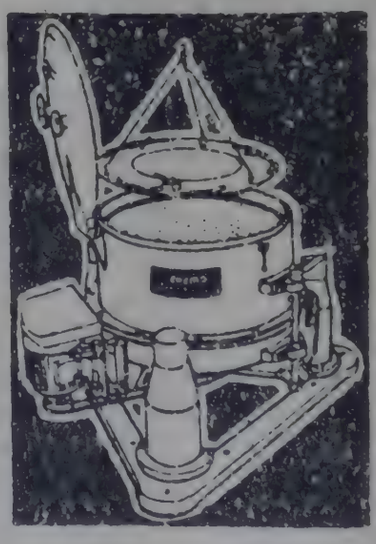

CONTACT MANUFACTURER:

CHEMO FAB INDUSTRIES

Ram Baug, S.V. Road, Chinchcli,
Behind State Bank Of India,
Malad (West), Bombay-400 064.
Ph.: Fac.: 6821401/6821695 Resi.: 6821894

Agent for South India: **M/s. TECSYS**, 3, Krishnappa Maistry Street, Woods Road, Madras-600 002. **Phone: 849727**

Agent for Andhra Pradesh: Mr. M.N. Rao, **M/s. Aniruddh Agencies,** B-104, Badruka Enclave, Road No. 12, Banjara Hills, Hyderabad-500 034.

ETHYL THIO ETHANOL: From Belgium: Chemo Pharma Laboratories Ltd., 8,000 Kgs., Rs. 1,42,945.

ETHYLENE GLYCOL: From FRG: Uptron India Ltd., 2,200 Kgs., Rs. 61,504.

ETHYLENE GLYCOL MONOBUTYL ETHER: From FRG: Rajasthani Trading Co., 9,620 Kgs., Rs. 2,06,876.

FUMED SILICA: From UK: Coates India Ltd., 1,008 Kgs., Rs. 1,04,168.

GALLIC ACID (TECH. MIN. 98%): From China: Zora Pharma Pvt. Ltd., 2,000 Kgs., Rs. 1,84,930.

GAMMA FERRIC OXIDE: From FRG: The New Vinod Silk Mills Pvt. Ltd., 1,750 Kgs., Rs. 1,45,428.

HELIOTROPIN: From Japan: Seth Brothers (Perfumers) Pvt. Ltd., 216 Kgs., Rs. 84,975.

HEXACHLORO CYCLOPENTADIENE: From USA: Excel Ind. Ltd., 112.4 MTs., Rs. 33,16,371.

HYDRAZINE HYDRATE 80%: From Japan: Rajshi Chemicals & Products, 5 MTs., Rs. 1,61,248; From USA: Chemo Pharma Laboratories Ltd., 15.200 MTs., Rs. 4,54,457.

HYDROFLUORIC ACID: From FRG: Bharat Heavy Electricals Ltd., 684 Kgs., Rs. 31,146.

HYDROGEN PEROXIDE 50%: From France: Amar International, 18,720 Kgs., Rs. 1,88,528.

HYDROXY CITRONELLOL: From UK: Casmair Products, 370 Kgs., Rs. 90,545.

HYDROXY ETHYL CELLULOSE: From Netherlands: PDI Chemicals Ltd., 1,000 Kgs., Rs. 72,386.

HYDROXYQUINOLINE: From France: Multichem Laboratories, 1,000 Kgs., Rs. 2,01,651.

HYDROXYLAMINE SULPHATE: From Netherlands: Apte Amalgamations Ltd., 40 MTs., Rs. 11,01,865.

IODINE CRUDE: From Japan: Gayatri Laboratories Pvt. Ltd., 1,000 Kgs., Rs. 3,04,841.

ISO BORNYL ACETATE: From GDR: Dyes Distributors India Ltd., 25,000 Kgs., Rs. 4,28,188.

ISO BORNYL METHOXY CYCLOHEXANOL (N): From Japan: Hindustan Lever Ltd., 540 Kgs., Rs. 92,622.

ISOBUTYL BENZENE PURE: From USA: C. Well Drugs Pvt. Ltd., 13.657 MTs., Rs. 6,94,150.

ISOCAMPHYL CYCLOHEXANOL ISOMERS: From FRG: H & R Aromatics Pvt. Ltd., 900 Kgs., Rs. 3,15,558.

ISODODECANE: From UK: Bindal Agro Chem Ltd., 1,950 Kgs., Rs. 26,356.

ISOPHTHALIC ACID: From USA: Bakelite Hylam Ltd., 32,659 Kgs., Rs. 4,91,782.

ISO PROPYL ALCOHOL: From FRG: Formica India Division, 12.246 MTs., Rs. 1,40,090; From Netherlands: Kopran Chemical Co. Ltd., 12.8 MTs., Rs. 1,30,924.

LITHIUM ALUMINIUM HYDRIDE: From FRG: Glindia Ltd., 75 Kgs., Rs. 1,78,083.

LITHIUM METAL: From FRG: Roche Products Ltd., 500 Kgs., Rs. 4,12,150.

METHACRYLIC ACID: From Japan: Colour Chem Ltd., 4,940 Kgs., Rs. 1,75,834.

METHANE SULFONYL CHLORIDE: From USA: Glindia Ltd., 544.32 Kgs., Rs. 38,522.

3 METHYL AMINO PROPYLAMINE: From Japan: Exon Laboratories Ltd., 1,530 Kgs., Rs. 1,55,080.

METHYL CHLOROFORMATE: From USA: Gujarat Insecticides Ltd., 30,372 Kgs., Rs. 5,97,418.

METHYL ETHYL KETONE: From FRG: Jai Electronic Inds. Pvt. Ltd., 12,960 Kgs., Rs. 2,35,307.

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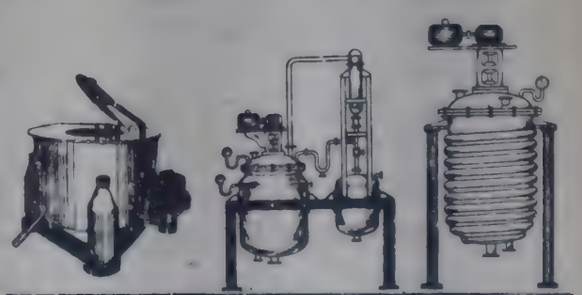

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MOLYBDENUM TRIOXIDE: From Japan: Sudarshan Chemical Inds., 1,000 Kgs., Rs. 1,14,086; From UK: Anupam Colours & Chemicals Inds., 500 Kgs., Rs. 64,518.

MONOCHLORO ORTHO PHENYLPHENOL: From UK: Nath Peters Pharmaceuticals Co., 1 MT., Rs. 1,14,888.

MONOCROTOPHOS TECH. 70% MIN.: From Taiwan: Pesto Chem India, 16,000 Kgs., Rs. 13,09,238.

MONOSODIUM GLUTAMATE 99%: From Thailand: Salvi Chemicals Inds., 17,500 Kgs., Rs. 4,26,840.

MURIATE OF POTASH: From FRG: India Potash Ltd., 17,711.498 Kgs., Rs. 3,93,72,489.

N,N DIMETHYL ACETAMIDE: From FRG: Ranbaxy Laboratories Ltd., 4,180 Kgs., Rs. 1,15,788.

NAPHTHENIC ACID: From FRG: SMP Pvt. Ltd., 10,140 Kgs., Rs. 1,57,466.

NEOPENTYL GLYCOL: From FRG: Dr. Beck & Co. (I) Ltd., 5,000 Kgs., Rs. 1,13,320; M.J. Pharmaceuticals Ltd., 15,000 Kgs., Rs. 3,28,628.

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OCTAMETHYL CYCLOTETRASILOXANE: From FRG: Hico Products Ltd., 14,400 Kgs., Rs. 6,45,808.

OCTOIC ACID: From FRG: Union Laboratory, 5,180 Kgs., Rs. 95,659; From Japan: Aryavart Chemicals Pvt. Ltd., 14.4 MTs., Rs. 2,23,597.

ORTHO PHENYL PHENOL: From UK: Nath Peters Pharmaceuticals Ltd., 250 MTs., Rs. 22,268.

PARACHLORO TOLUENE: From FRG: Benzo Chem Inds. Pvt. Ltd., 14,400 Kgs., Rs. 4,53,280; From Italy: Rallis India Ltd., 35,200 Kgs., Rs. 11,08,019.

PARAFORMALDEHYDE: From Spain: K.D. Sanghvi & Co., 18 MTs., Rs. 1,60,035.

PARAFORMALDEHYDE 91%: From Spain: Asian Paints India Ltd., 16,000 Kgs., Rs. 1,47,289.

PARAFORMALDEHYDE 96% PRILLS: From Spain: Chemo India, 18 MTs., Rs. 1,64,284; D. Jamnadas & Co., 18 MTs., Rs. 1,60,035; Rallis India Ltd., 9,000 Kgs., Rs. 84,994; United Metachem Pvt. Ltd., 8.25 MTs., Rs. 79,192.

PARAFORMALDEHYDE 97%: From Spain: Rallis India Ltd., 7,000 Kgs., Rs. 85,920.

PARA OCTYL PHENOL: From Japan: IVP Limited, 14,000 Kgs., Rs. 3,08,426.

PIPERIDINE: From FRG: Srinivas Chemical Inds. Ltd., 1,020 Kgs., Rs. 1,08,737.

POLYVINYL ALCOHOL: From Japan: The Arvind Mills Ltd., 2 MTs., Rs. 88,122; Manar Size Pvt. Ltd., 1,500 Kgs., Rs. 70,812; Nutan Sizing Inds., 1 MT., Rs. 47,208.

POLYVINYL PYRROLIDONE: From FRG: Cadila Laboratories Pvt. Ltd., 180 Kgs., Rs. 28,644.

POTASSIUM CHLORIDE: From Canada: Hindustan Organic Chemicals Ltd., 500 MTs., Rs. 16,00,821; Indian Dyestuff Inds. Ltd., 40,000 K Rs. 1,32,183.

POTASSIUM FERROCYANI From GDR: Tata Exports Ltd., 16, Kgs., Rs. 3,09,504.

PROCAINE HYDROCHLORI BP 80: From FRG: Indian Drugs Pharmaceuticals, 5 MTs., Rs. 8,89,0

PROPIONIC ACID: From FR Neelikon Dyestuffs, 16,800 K Rs. 2,04,480.

PROPIONIC ANHYDRIDE: Fr Japan: Wockhardt Ltd., 5,510 K Rs. 2,43,509.

PROPYLENE GLYCOL: Fr Japan: Unibond Industries, 5,670 K Rs. 1,16,999; From USA: JKB Enterprises, 17,200 Kgs., Rs. 3,51,8 Parikh Chemicaal Inds., 16.77 M Rs. 3,43,062.

PROPYLENE GLYCOL TEC From Japan: Unisets Inds., 5,250 K Rs. 1,08,332; Unique Resins Industr 5,250 Kgs., Rs. 1,08,332.

PROPYLENE OXIDE: From FR BASF India Ltd., 3,520 K Rs. 1,40,379; From Netherlands: I Ichi Karkaria Ltd., 16,950 K Rs. 3,78,751.

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RESORCINOL: From Japan: Shi International, 5,000 Kgs., Rs. 3,22,5

SELENIUM METAL (POWDE 99.9% PURE: From Japan: Neo Tech Chemicals, 716.5 Lbs., Rs. 96,625.

SELENIUM SULFIDE USP: Fr Spain: Abbott Laboratories (I) Lt 1,000 Kgs., Rs. 3,41,944.

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SILICA PRECIPITATED: Fr FRG: Cable Corporation of India Lt 7,500 Kgs., Rs. 1,13,321.

DIUM METHALLYL SULNATE: From Japan: J.K. Syntheimited., 3,000 Kgs., Rs. 1,62,868.

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LVENT NAPHTHA: From FRG: Polymers Pvt. Ltd., 49,200 Kgs., 4,04,729.

TANNOUS OCTOATE: From : J.J. Foams Pvt. Ltd., 600 Kgs., 89,695.

ETRAHYDROFURAN: From : Lupin Laboratories Limited, 40 Kgs., Rs. 6,18,728; S.D. Fine m Private Limited, 900 Kgs., 43,817.

ITANIUM DIOXIDE: From FRG: ional Rayon Corpn. Ltd., 10,000 s., Rs. 4,15,432.

ITANIUM DIOXIDE ANATASE: m FRG: Gujarat Nylons Ltd., 20,000 s., Rs. 8,52,227.

ITANIUM TETRACHLORIDE: m UK: Polyolefins India Ltd., 5.088 s., Rs. 1,12,091.

RIACETIN PLASTICIZERS: m USA: Hind Filters Ltd., 2,404 s., Rs. 76,037.

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TRIMETHYL PHOSPHITE: From A: Apex Enterprises, 1,077.295 Kgs., . 48,653; Sudarshan Chemical Inds. d., 15,513.048 Kgs., Rs. 5,63,903.

TRIMETHYL PHOSPHITE MIN. .5%: From USA: Glindia Ltd., 292.754 Kgs., Rs. 58,994.

3,4,5 TRIMETHOXY BENZALEHYDE: From Japan: New Generic rug House Ltd., 2,010 Kgs., s. 7,43,292.

VANILLIN P: From USA: Rallis dia Ltd., 1,000 Kgs., Rs. 2,17,860.

XYLENOL: From FRG: Dr. Beck & Co. (I) Ltd., 15,200 Kgs., Rs. 3,76,720.

XYLENOL 50: From Italy: Dr. Beck & Co. (I) Ltd., 46,800 Kgs., Rs. 9,02,147.

2,6 XYLIDINE: From Switzerland: Mahendra Chemicals, 1,400 Kgs., Rs. 1,69,084.

ZINC STEARATE: From USA: Polyogen Ltd., 11,793.6 Kgs., Rs. 5,28,174.

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LDPE: From Finland: Upcom Cables Ltd., 32,000 Kgs., Rs. 7,84,323; From Qatar: Ecoplast Pvt. Ltd., 8.5 MTs., Rs. 1,60,508; Profeel Sentinel Ltd., 82.5 MTs., Rs. 15,57,867.

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POLYPROPYLENE: From Australia: Hindustan Pipe Udyog Ltd., 15,000 Kgs., Rs. 2,77,005; Rinins Plast Pvt. Ltd., 15,000 Kgs., Rs. 2,85,819; From Belgium: Borana Plastics, 15 MTs., Rs. 2,43,122; New Plastomers India Ltd., 30,000 Kgs., Rs. 4,86,244; From Brazil: Plasto Metchem (Ind) Pvt. Ltd., 439 MTs., Rs. 56,87,573; From Belgium: Rajasthan Petro Syn. Ltd., 30,000 Kgs., Rs. 5,58,731; Shah Polymers, 15,000 Kgs., Rs. 2,43,122; From France: Cosmo Films Ltd., 1,81,500 Kgs., Rs. 29,62,342; From Japan: Varsha Plastic Pvt. Ltd., 105 MTs., Rs. 14,87,059; From Korea: Garware Wall Ropes Ltd., 53.96 MTs., Rs. 16,87,267; From Spain: Alpha Packaging, 105 MTs., Rs. 15,69,670; Diamond Polyplast Pvt. Ltd., 14,000 Kgs., Rs. 2,40,323; Hemant Agencies, 14,000 Kgs., Rs. 2,40,323; Plastic International, 2 MTs., Rs. 84,975; From USA: Paharu Plastics, 16.215 MTs., Rs. 2,43,088; Superpack 192.253 MTs., Rs. 28,86,041; From Yugoslavia: Shjarech Overseas Corpn., 15.5 MTs., Rs. 2,36,987; Foreign Fashions, 31 MTs., Rs. 5,39,798; Garware Wall Ropes Ltd., 2,17,000 Kgs., Rs. 1,22,32,443; Grover Overseas Pvt. Ltd., 45.5 MTs., Rs. 7,13,403; New Horizon Offcon Pvt. Ltd. 15.5 MTs., Rs. 2,44,912; Ravi Intl., 15,500 Kgs., Rs. 2,37,127; Ruparal Plastics, 31 MTs., Rs. 4,91,173; Wimco Pen Company, 31 MTs., Rs. 4,92,810.

POLYSTYRENE: From Korea: Asian Advertisers, 17,000 Kgs., Rs. 3,74,518; Bright Brothers Ltd., 17 MTs. Rs. 3,93,243; Ganpati Properties Pvt. Ltd., 34 MTs., Rs. 7,69,546; Janata Plastics Corpn., 17 MTs., Rs. 3,87,893; K.K. Nag Private Ltd., 12,000 Kgs., Rs. 3,35,612; Khemka Containers (P) Ltd., 12 MTs., Rs. 3,24,179; Nuthern Packing Group & Inds., 12 MTs., Rs. 3,35,149; Prem Exports, 12,000 Kgs., Rs. 3,29,748; Thermopack Inds., 12 MTs., Rs. 3,51,113.

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CITRIC ACID MONOHYD BP 80: From China: Metro Pr India, 20,000 Kgs., Rs. 3,46,193 ciality Chemicals, 20,000 Rs. 3,46,193.

D-CALCIUM PANTOTHEN From Japan: Boehringer Knoll Lt Kgs., Rs. 1,88,832; From UK: Products Ltd., 1,200 Kgs., Rs. 3,1

EPHEDRINE HCl BP 80: FRG: Lyka Labs Ltd., 500 Rs. 3,93,683.

L-LYSINE MONO HCl USP: Korea: K. Mansukhlal & Co., 50 Rs. 48,388.

MORPHOLINE: From UK: India Ltd., 16,380 Kgs., Rs. 5,5

PHENOBARBITONE USP: USSR: Tata Exports Ltd., 2,000 Rs. 3,42,806.

PROPYLENE GLYCOL USP: Japan: Imkemex India Ltd., 1 Kgs., Rs. 3,52,734; From USA: Enterprise, 34,400 Kgs., Rs. 6,3 S. Kushalchand & Co., 41,925 Rs. 7,98,780.

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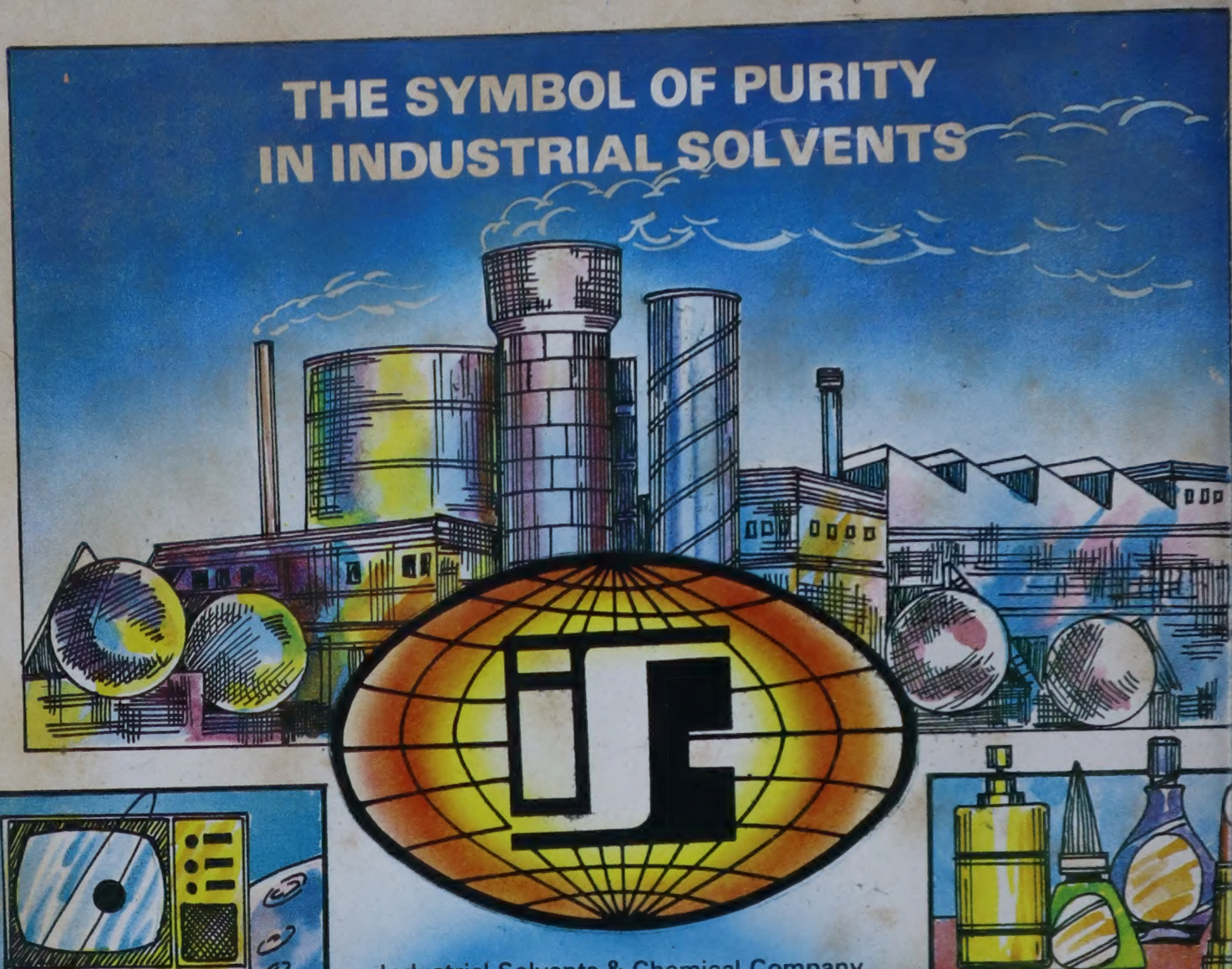
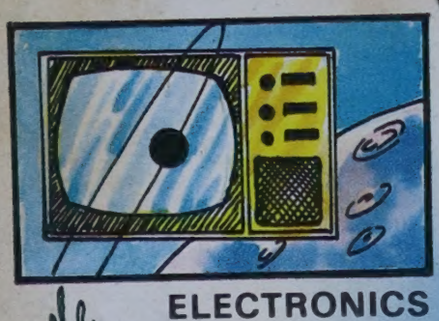
THE SYMBOL OF PURITY IN INDUSTRIAL SOLVENTS



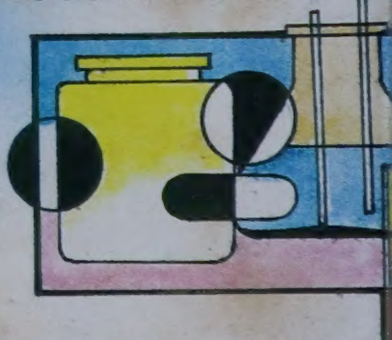


ELECTRONICS

COSMETICS

Industrial Solvents & Chemical Company offer naked products at competitive prices ex- Thane Godown from four separate filling points Of-course, ISC continues to supply original barrels of these NOCIL CHEMICALS : IPA-CBM, Acetone, DAA, MIBK, IBA, EDC, Isopropanol, Butanol, 2-Ethyl, Hexanol, MEG, DEG. and Polyethylene Glycol 200/300/400/600/1500.

SURFACE COATING



DRUGS & PHARMACEUTICAL

NOCIL

Authorised Distributor

For Your Requirements Please Contact

Industrial Solvents & Chemical Co.

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BOMBAY-400 021 TEL : 2028162/2024774 GRAM : INSOCHEM